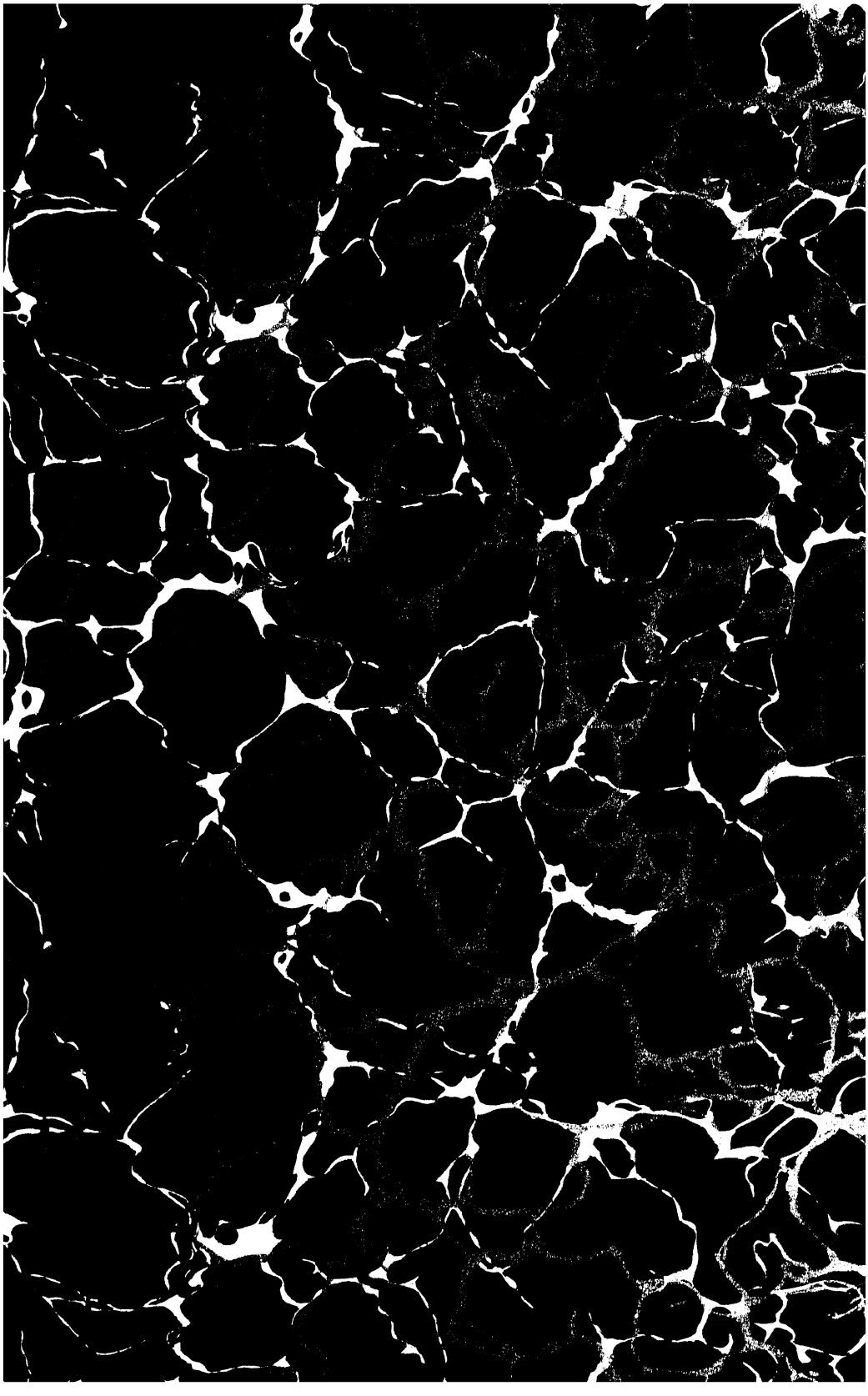




THE NEW INTERNATIONAL ENCYCLOPÆDIA

SECOND EDITION

VOLUME V

NEW YORK
DODD, MEAD AND COMPANY
1918

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ILLUSTRATIONS IN VOLUME V

COLORED PLATES

FACING PAGE

CHRYSANTHEMUMS 300
CITRUS FRUITS 358
CLAMS AND EDIBLE MUSSELS 390

MAPS

CHICAGO 166
CHICAGO 168
CHILE 194
CHINESE REPUBLIC 206
CINCINNATI 332
CIVIL WAR IN AMERICA 382
CLEVELAND 450
COLOMBIA 598
COLORADO 610
COLUMBUS 636
CONGO 734
CONNECTICUT 758

ENGRAVINGS

CHAMONIX 24
CHAUCER, GEOFFREY 98
CHESTNUT 158
CHICAGO — The Art Institute and the Public Library 170
CHICAGO — The Chicago and North Western Station and Michigan Avenue 172
CHICAGO, UNIVERSITY OF, Library 174
CHOIR 260
CINCHONA 330
CLOUD FORMS, Typical 480
COAL-MINING, Views of Breaker 500
COAL-MINING 502
COAL-MINING 503
COAST-DEFENSE GUNS — United States Army 512
COAST-DEFENSE GUNS 514
COAST-DEFENSE MORTAR 515
COCKATOOS AND MACAWS 532
CODFISH AND ALLIES 538
COLOGNE 596
COLUMBUS, OHIO, The State House 636
COLUMBUS, CHRISTOPHER 638

FACING PAGE

COLUMNS, Typical, in Architecture 642
CONCRETE, Reënforced 708
CONCRETE, Reënforced 709
CONSTABLE, JOHN ("The Hay Wain") 788
CONSTANTINE, ARCH OF 792

KEY TO PRONUNCIATION

For a full explanation of the various sounds indicated, see the KEY TO PRONUNCIATION in Vol. I.

ā as in ale, fate.
ȧ " " senate, chaotic.
â " " glare, care, and as *e* in there.
ă " " am, at.
ä " " arm, father.
à " " ant, and final *a* in America, armada, etc.
a " " final, regal, pleasant.
a̤ " " all, fall.
ē " " eve.
ė̄ " " elate, evade.
ĕ " " end, pet.
ē " " fern, her, and as *i* in sir, etc.
e " " agency, judgment.
ī " " ice, quiet.
i̇ " " quiescent.
ĭ " " ill, fit.
ō " " old, sober.
ȯ " " obey, sobriety.
ô " " orb, nor.
ŏ " " odd, forest, not.
o " " atom, carol.
oi " " oil, boil.
o͞o " " food, fool, and as *u* in rude, rule.
ou " " house, mouse
ū " " use, mule.
u̇ " " unite.
ŭ " " cut, but.
u " " full, put, or as *oo* in foot, book.
û " " urn, burn.
y " " yet, yield.
B " " Spanish Habana, Córdoba, where it is like English *v* but made with the lips alone.

ch as in chair, cheese.
D " " Spanish Almodovar, pulgada, where it is nearly like *th* in English then.
g " " go, get.
G " " German Landtag = *ch* in Ger. ach, etc.
H " *j* in Spanish Jijona, *g* in Spanish gila; like English *h* in hue, but stronger.
hw " *wh* in which.
K " *ch* in German ich, Albrecht = *g* in German Arensberg, Mecklenburg, etc.
n̤ " in sinker, longer.
ng " " sing, long.
N " " French bon, Bourbon, and *m* in the French Étampes; here it indicates nasalizing of the preceding vowel.
sh " " shine, shut.
th " " thrust, thin.
TH " " then, this.
zh " *z* in azure, and *s* in pleasure.

An apostrophe ['] is sometimes used as in tā'b'l (table), kăz''m (chasm), to indicate the elision of a vowel or its reduction to a mere murmur.

For foreign sounds, the nearest English equivalent is generally used. In any case where a special symbol, as G, H, K, N, is used, those unfamiliar with the foreign sound indicated may substitute the English sound ordinarily indicated by the letter. For a full description of all such sounds, see the article on PRONUNCIATION.

A PARTIAL LIST OF THE LEADING ARTICLES IN VOLUME V

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Mr. Frederick Remsen Hutton.

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THE NEW INTERNATIONAL ENCYCLOPÆDIA

CHÆRONEA, kĕr'ō-nē'ȧ (Lat., from Gk. Χαιρώνεια, *Chairōneia*). An ancient town of Bœotia, near the Cephissus, on the borders of Phocis, at the head of the last defile where a stand could be made against an invader of central Greece (Map: Greece, Ancient, C 2). Here, in 338 B.C., Philip of Macedon signally defeated the united forces of the Athenians and Bœotians, and so crushed the liberties of Greece. A mound of earth, about a mile from the modern village of Kapræna, which occupies the site of the old city, still marks the place where the Thebans who fell in the battle were buried; the grave was also marked by a magnificent colossal lion (quite recently restored). At Chæronea also, 86 B.C., Sulla defeated Archelaus, the general of Mithridates. Plutarch was a native of this town.

CHÆTODONTIDÆ, kē'tō-dŏn'tĭ-dē (Neo-Lat. nom. pl., from Gk. χαίτη, *chaitē*, mane + ὀδούς, *odous*, tooth). A family of tropical spiny-rayed fishes. See BUTTERFLY FISH.

CHÆTOGNATHA, kē-tŏg'nȧ-thȧ (Neo-Lat. nom. pl., from Gk. χαίτη, *chaitē*, mane + γνάθος *gnathos*, jaw). An aberrant marine worm, cylindrical or fish-shaped, belonging to a division of the Nemathelminthes. It includes the arrow worms (*Sagitta*) and the related genus *Spadella*.

CHÆTOPODA, kē-tŏp'ō-dȧ (Neo-Lat. nom. pl., from Gk. χαίτη, *chaitē*, mane + πούς, *pous*, foot). Marine worms. See ANNULATA.

CHAFARINAS, chȧ-fȧ-rē'nȧs, or ZAFFARINES. A group of three small islands belonging to Spain, situated off the coast of Morocco, opposite the mouth of the Muluya River, in long. 2° 26′ W. The Chafarinas, the *Tres Insulæ* of the ancients, have long been known for the natural harbor or refuge they afford. There are fortifications on the middle island. Spain took possession of the group in 1848 and is building a breakwater to unite the middle island, Isabella II, with the near-by islet El Rey, for the purpose of inclosing a deep and sheltered anchorage for large ships. Pop., 1900, 426; 1910, 736.

CHAFER, or **COCKCHAFER** (AS. *ceafor*, Ger. *Käfer*, OHG. *kevar*, *chevaro;* probably connected with Ger. *Keifer*, MHG. *kiver*, AS. *ceáfl*, OS. *kāfl*, jawbone), ETC. A beetle of the family Scarabæidæ. In England all scarabs (dung beetles) are so called, the name being found frequently as the last part of such compounds as cockchafer, leaf chafer, rose chafer, etc. The cockchafer, May beetle, or dor bug (*Melolontha vulgaris*) is substantially the same as the Junebug (q.v.) of the United States. See SCARABÆIDÆ.

CHAF'FEE, ADNA ROMANZA (1842–1914). An American soldier. He was born at Orwell, Ohio, and in 1861 entered the Sixth United States Cavalry. He was promoted to be first lieutenant in 1865, and in the same year received the brevet of captain for gallant conduct at Dinwiddie Court House. In 1897 he was made lieutenant colonel, and in 1898 saw service in Cuba during the Spanish-American War, distinguishing himself at El Caney, and was brevetted major general of volunteers. In 1900 he was sent to take command of the United States forces in China, being promoted to be major general of volunteers, and took an important part in the expedition against Peking. Subsequently he was put in command of the United States army in the Philippine Islands. In 1901 he was appointed major general in the regular army. He succeeded Gen. S. B. M. Young as lieutenant general and chief of staff in 1904 and was retired on Feb. 1, 1906.

CHAFFINCH (so called because the *finch* is fond of *chaff*, or grain). A handsome and familiar European finch (*Fringilla cælebs*) and one of the foremost cage birds, especially in Germany. It is common in England and known there by many provincial names. The male, in summer, has the top of the head and nape of the neck bluish gray; the back chestnut; the wings almost black, with two conspicuous white bars; the tail nearly black. The colors of the female (and of the male in winter) are much duller than those of the summer male. In the colder northern countries it is migratory, but spends the winter in flocks in England and all around the Mediterranean, where it is shot in great numbers for market, especially in Italy. It builds a very soft and beautiful nest, garnished with lichens and placed in a bush, and lays spotted eggs. Its food is highly varied, and its habits generally are typically fringilline.

The chaffinch is one of the birds most sought by bird catchers, as well as reared from the nest, to be a cage songster. Its naturally loud, clear, and thrilling voice is susceptible of being trained almost to articulate human words; and so docile is it that the German bird trainers teach these finches several distinct tunes and trills besides

cultivating their own powers of melody and imitation. Bechstein, in *Naturgeschichte der Stubenvögel* (Gotha, 1792), gives an extended account of these vocal accomplishments, the proper acquirement of which renders chaffinches among the most valuable of cage birds. See CAGE BIRD, and Plate of CAGE BIRDS.

CHA'FIN, EUGENE WILDER (1852–). An American temperance advocate and Prohibition party candidate for President of the United States, born at East Troy, Wis. Admitted to the bar in 1875, he was in practice at Waukesha, Wis., from 1876 to 1900, and from 1901 to 1904 was superintendent of the Washingtonian Home, Chicago. He was the Prohibition candidate for Congress (Wisconsin) in 1882 and (Chicago) in 1902, for Attorney-General of Wisconsin in 1886 and 1900, for Governor of Wisconsin in 1898, for Attorney-General of Illinois in 1904, and for President of the United States in 1908 and 1912. In 1908 he was admitted to the bar of the Supreme Court of the United States, and in the following year moved to Arizona. He is author of *Voters' Handbook* (1876); *Lives of the Presidents* (1896); *Lincoln, the Man of Sorrow* (1908); *Washington as a Statesman* (1909). Chafin became known as one of the most active speakers and organizers in the temperance and prohibition movements.

CHAGA, chä'gȧ, or **WA CHAGA,** wä chä'gȧ. A Bantu people on the southern slopes of Mount Kilimanjaro, German East Africa. They are an interesting people, friendly, exceedingly superstitious, much harassed by the Masai, and in turn raiding the Wa Gweno and other tribes. The Chaga possess considerable skill in iron-working, their assegais being the largest and finest in Africa. Their hide shields are large, oval, decorated with colored symbols; the present form, borrowed from the Masai, has superseded the old type of shield, which was of buffalo hide, long, narrow, and decorated only with incised lines. They employ poisoned arrows. They brew beer in large wooden vessels and have partially domesticated the wild bee. They hunt also the abundant fauna on the slopes of Kilimanjaro, but do not ascend very high up the mountains. Consult Bruno Gutmann, *Dichten und Denken der Dschagganeger* (Leipzig, 1909).

CHAGOS (chä'gŏs) **ISLANDS.** A small archipelago in the Indian Ocean, situated between lat. 4° 44′ to 7° 39′ S. and long. 70° 55′ to 72° 52′ E. (Map: World, Eastern Hemisphere, K 28). They are mostly of coral formation. The chief island of the group, Diego Garcia, is over 12 miles long and over 6 miles wide; pop. 1911, 517. The chief product is coconut oil. The group belongs to Great Britain and is an administrative dependency of Mauritius. It has an aggregate land area of 76 square miles.

CHAGRES, chä'grȃs. A river of Panama rising in the Cordillera de San Blas, flowing southwest, west, and northwest into the Caribbean Sea (Map: Panama Canal). The mouth of the old river bed is about 7 miles west of Colon. The river supplies the water required to operate the locks of the Panama Canal, which follows the bed of the stream from Mindi to Gamboa. The tremendous rise of this river during freshets, as much as 32 feet in 24 hours, presented one of the most formidable engineering problems in connection with the construction of the canal. The building of the Gatun Dam, thereby forming Gatun Lake, successfully solved the problem.

CHAHA, chä'hȧ, or **CHAJA.** See SCREAMER.

CHAILLÉ-LONG, shȧ'yȧ'lôN', CHARLES (1840–). An American diplomat and explorer. He was born in Maryland, of French descent, and served in the Union army during the Civil War. In 1869 he was appointed lieutenant colonel in the Egyptian army, and four years later became chief of staff to General Gordon, then engaged in suppressing the slave trade on the White Nile. Soon afterward he was sent by the Khedive to the court of the King of Uganda, who acknowledged himself the vassal of Egypt. He published an account of this expedition in *Central Africa: Naked Truths of Naked People* (1876). Returning to New York, he studied law at Columbia and in 1882 went to Alexandria to practice international law. There he rendered important services during the Alexandria massacre and the subsequent bombardment by the English squadron. In the absence of the United States Consul General and consular agents, he reëstablished the consulate and protected many Europeans and Americans. Later in the same year he practiced international law in Paris, and in 1887 was appointed United States Consul General and Secretary of Legation in Korea. He was secretary of the Universal Postal Congress at Washington in 1897, and special representative of the United States to the Paris Exposition in 1900. In 1884 he published *The Three Prophets: Chinese Gordon, the Mahdi, and Arabi Pasha.* Other publications: *L'Afrique Centrale* (1877); *Les Sources du Nil* (1891); *L'Egypte et ses provinces du Calme Matinal* (1894).

CHAIN (OF. *chaine,* Fr. *chaîne,* Dutch *keten, ketting,* MLG. *kedene, kede,* Ger. *Kette,* OHG. *chetina,* from Lat. *catena,* chain). A series of flexibly connected links of metal or other material designed for ornament or to serve the purpose of cord, rope, or cables. Chains are evidently of very ancient origin. Nearly all old writers speak of their use, and they are repeatedly referred to in the Bible. Remnants of chains of Roman manufacture are preserved in museums, and they show a variety of link formations and excellent workmanship. The uses made of chains by the ancients were few and unimportant compared with the multitude of uses to which they are applied at present. They served for ornament, as emblems of investiture and badges of office, and as fetters for captors, but cordage was employed for all other purposes to which chains are now extensively applied. Chains are now employed as ornaments and for the various purposes of a band, cord, rope, or cable in hoisting and hauling operations, in transmitting power, and in connecting, confining, and restraining objects. The modern chain of commerce, therefore, embraces chains varying in size and material, from the threadlike article of pure gold to the ship's cable of iron, each link of which weighs from 100 to 200 pounds, and will withstand a breaking strain of many tons.

Structurally chains may be somewhat roughly divided into those whose separate links are each composed of a single piece of metal and those whose links are each made up of several separate pieces of metal. The ordinary oval-link hoisting chain is an example of the first class, while the bicycle chain exemplifies quite well the second class. Chains may be also loosely divided into handmade and machine-made chains. It is also common practice to define

chains by special names based upon the form of the link, as stud chains, open-link chains, and twisted-link chains; or upon the use to which the chain is put, as crane chain, chain cable, and bicycle chain; or upon the name of the inventor or some other real or apparent peculiarity.

Chains are made in a variety of ways, depending upon the material used, the size, the link formation, the purpose to which the article is to be put, etc. Chains for cranes, ship's cables, dredges, etc., are always handmade, i.e., each link is welded by hand and often is both formed and welded by hand from rolled bar iron. The various stages of operation are substantially as follows: The workman, taking a round bar or rod of iron of the proper diameter, heats it in a forge and then by means of a chisel cuts off a piece long enough to form a single link. This piece is again heated and then bent by hammer blows around a suitably shaped nose until it has a U-shape. The U-shaped piece is then hooked into the last completed link of the chain and the unconnected ends thrust again into the forge to receive a welding heat. The final process is to weld together the unconnected ends around a nose of suitable shape and to bring the link to perfect form and dimensions. In chains made as just described, the weld is usually at the end of the link. When making large ship's cables, the chain maker often uses presses for bending the bars into link form, and the bending is so done as to bring the weld at the side of the link. The welding in large cables may also be done by power hammers.

In making stud chains or twisted-link chains the only change in the mode of procedure described above is the introduction of the necessary additional operation of inserting the brace or stud or of twisting the link, just previous to closing up the ends of the U-piece for the final welding operation. A stud chain is an open-link chain, in each link of which a transverse stud or brace is placed to prevent the sides of the links from closing up or drawing together when the chain is subjected to a heavy pull or load. Twisted links are of great advantage when a chain has to be wound on a drum, since they lie flat and smooth on the drum.

Generally speaking, all chains over one inch in size are made by hand. Machine-made iron chains are of two kinds, known as welded chains and weldless chains. In making welded chains by machine the rod of iron is first run through a machine called a winder, which winds it round a mandrel and turns it out in the form of a long spiral spring. This rod is then cut by a machine so that each twist or spiral is severed from the next and the stock is in the form of rings whose open ends only need to be welded together to form complete closed links. The welding is done by heating the ring and placing it in dies, which, under the blows of a trip hammer operated by the workman's foot, form it into shape and weld together the open ends.

These small sizes of machine-welded chains are often made with twisted links, but are never made in the form of stud chains. Weldless machine-made chains are manufactured by automatic machinery which takes the rolled iron, cuts it into lengths, forms these lengths into links, and connects or couples the links into completed chains. In weldless chains the links are formed by twisting or locking the unconnected ends of the short lengths of rod. There are numerous forms of such connections, and certain advantages are claimed for each form. Chains of this construction are made only in the small sizes which are used for horse halters, cow ties, dog chains, fence chains, and similar purposes. For many of these brass, bronze, and composition metals are used instead of iron, but the process of manufacturing the chain is otherwise unchanged. With the exception of the stud chain, the chains so far described have each link composed of a single piece of metal bent to form and welded, twisted into a closed ring.

Chains for transmitting power are of an entirely different construction. In certain of these each link is made of several pieces of metal connected by rivets, bolts, or stud screws, and is so formed as to engage with the teeth of a sprocket wheel. The bicycle chain is an excellent example of this variety. Chains of this kind are made by assembling by hand the several parts composing each link and connecting them; the separate parts are themselves cut, stamped, turned, threaded, or otherwise formed by machinery designed especially for the purpose. Drive chains may be made of malleableized cast iron, each link a separate unit, and so formed that one link can be slid sidewise to lock with the next one, but cannot unlock except in a position which the links will never occupy relatively to each other in service.

Silent chains are those in which each link is made up of several plates set edgewise and side by side, and with profiles on the inner or driving side which fit the epicycloidal or involute profiles of the ordinary spur-gear wheel. Such chains are much used in driving the pump and valve-gear shafts in motor vehicles, and in transmitting motion and power to the driving or rear axle of such vehicles. The drive chain has a flexibility against the twisting action by road shocks far greater than any other means of transmitting power at the low speeds required. See BELT; LINK.

A chain used almost exclusively in plumbing for securing washbowl stoppers, etc., is called safety chain. Each link is stamped from a sheet of metal and has an eye at each end. The first link is bent around so that the eyes lie together; the next link is then threaded through the two eyes and bent to bring its eyes together.

Watch chains, neck chains, and other chains made of precious metal for ornament form a class by themselves. Some of the larger and heavier chains of this class, which are made in the simple forms common to the chains of brass and iron which have been described, are made by methods closely corresponding to those used in making iron and brass chains. The smaller sizes of wire chains are made by machinery with twisted and locked links, others are formed by methods analogous to that adopted in producing machine-made welded chains of iron, the links being closed by brazing instead of by welding. In still other forms the links are stamped and cut from metal plate and are assembled and brazed together by hand.

The strength of chains is a very important matter in certain uses to which chains are put. For example, the safety of an anchored ship and the lives of its crew may often depend upon the strength of its chain cable. For this reason the British Admiralty and corresponding organizations in other countries require all chain cable to undergo severe tests before it is used on shipboard. Similar tests are required by rail-

ways, builders of cranes and dredges, and other large users of chain. The size of chains is defined by the diameter of the bar of which the links are made; thus, a 1-inch chain is one whose links are made by bars one inch in diameter. According to tests made by the United States Testing Board, "with proper material and construction the ultimate resistance of chains may be expected to vary from 155 per cent to 170 per cent of that of the bar used in making the links and to show an average of about 163 per cent." This conclusion refers only to hand-welded chain cable. The Pennsylvania Railroad requires its 1½-crane chain to stand without giving way a pull of 70,000 pounds, and not to break under a load of 116,000 pounds. The British Admiralty requires a 2-inch stud-chain cable to withstand a proof load of 72 tons before it is used. These figures are selected at random for the purpose of illustration. For a statement of the test requirements of the Pennsylvania Railroad, the British Admiralty, and the United States Testing Board, see Kent, *Mechanical Engineer's Pocket Book* (8th ed., New York, 1913). Special literature on the manufacture of chains is very scarce, and such as there is will be found scattered through the engineering papers and the proceedings of the various engineering societies.

CHAIN, Anchor. See Cable; Anchor.

CHAIN, Engineer's, or Surveyor's. See Engineering Instruments.

CHAIN BRIDGE. See Bridge.

CHAIN CABLE. See Cable.

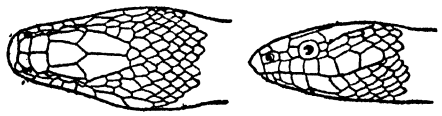
CHAIN CORAL. See Halysites.

CHAIN CREEPER. See Bauhinia.

CHAIN MAIL, or **CHAIN ARMOR.** A coat of hammered iron links, interwoven into the form of a garment. It was much more flexible and convenient than either the byrnie or plate armor, but was not so good a protection as the latter. It was much used from the twelfth to the fourteenth century. See Armor; Coat of Mail.

CHAIN SHOT. A projectile composed of two shots fastened together by a short chain, and used chiefly at sea to cut or destroy the enemy's rigging. It has long been obsolete.

CHAIN SNAKE. A North American harmless snake (*Ophibolus getulus*), found from the Hudson River and Great Lakes to Mexico, and subject to great variation in color and markings. The typical form of the East and South is lustrous black, crossed by about 30 yellow lines which unite along the sides, forming a chain-like pattern; the belly is yellowish, blotched with black; headplates black, with yellow spots. The lighter and larger variety west of the Mississippi is *sayi*, and that of the Pacific coast *boylii*. In the last the markings are ivory-



CHAIN SNAKE — TOP AND PROFILE VIEWS.

white, and in the form of bands encircling the body and broadening, but not coalescing, along the sides, so that it has been described as "cream colored, sharply marked by rings of black," instead of the reverse. Everywhere these snakes are large (4 to 5 feet), strong, active, and mainly nocturnal. They do not take to water nor climb trees, and feed mainly upon small mammals, amphibians, and reptiles, including other snakes; and they are protected by the country people of the South and West, as one of the "king" snakes (q.v.), because they constantly destroy venomous reptiles. The chain snake kills these serpents by constricting tightly, disregarding their repeated bites, as it is quite immune to their poison. See Plate of Snakes, American Harmless.

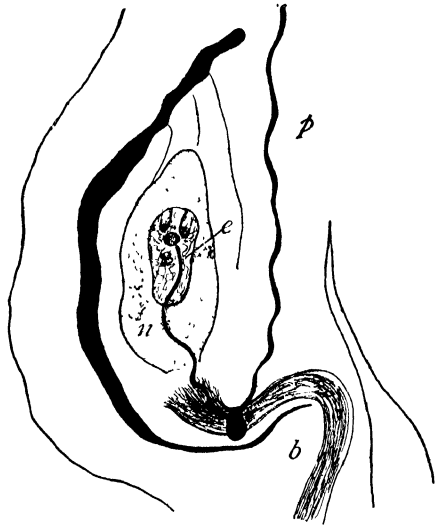
CHAIX D'EST ANGE, shā'dā'tänzh', Gustave Louis Adolphe Victor Charles (1800–76). A French advocate. He was a brilliant pleader. In 1857 Napoleon III appointed him *procureur général* and soon after Councilor of State. In 1862 he was made senator; in 1863 Vice President of the Council of State; and in 1864 President of the Department of Public Works and Fine Arts. He retired in 1870. Consult Rousse, *Chaix d'Est Ange* (3 vols., Paris, 1862 77).

CHAJ'JUG. See Hayyuj.

CHAKA, chä'ka, or **TCHAKA.** A chief of the Zulus. See Zululand.

CHALAZA, kà-lā'zà (Neo-Lat., from Gk. χάλαζα, *chalaza*, hailstone, pimple). The basal region of an ovule, in which there is no differentiation of integument. See Ovule.

CHALAZOGAMY, kăl'à-zŏg'à-mī (from Gk. χάλαζα, *chalaza*, hailstone, pimple + γάμος, *gamos*, marriage, from γαμεῖν, *gamein*, to marry).



Casuarina showing chalazogamy *p*, pollen tube descending to the chalazal region of the ovule and entering the bundle region (*b*), turning upward into the nucellus (*n*), entering the embryo sac (*e*) from below, and thus approaching the egg.

The passage of the pollen tube through the chalaza of the ovule. In seed plants the pollen tube ordinarily reaches the egg by passing through the micropyle, which is a small passageway left by the integument of the ovule. In certain cases, however, it has been discovered that the pollen tube does not enter in this way, but pierces the ovule in the general region of the chalaza, which is the base of the ovule, where the integument and body of the ovule are indistinguishable. In this way the tube approaches the egg from beneath and burrows its way through the intervening tissue. This phenomenon

is known as "chalazogamy," as distinguished from the ordinary method, which has been called "porogamy." Chalazogamy has been discovered as yet only in connection with the amentaceous trees, those in which it has been recorded being birch, alder, hornbeam, walnut, hazel, casuarina, and elm. While in most of these cases the pollen tube enters through the chalazal region, in the elm it passes into the ovule above the chalaza. However, the term "chalazogamy" has been extended to include all cases in which the pollen tube does not enter by way of the micropyle. When chalazogamy was first discovered in *Casuarina*, it was thought to indicate that this genus was the most primitive of the flowering plants. This view has continued to be held by certain botanists with the multiplication of cases of chalazogamy. These cases are so well scattered, however, that the general opinion is that chalazogamy is not a primitive feature, but may occur in any group of plants when the conditions are appropriate.

CHALCAN'THITE. A natural hydrous sulphate of copper, having the same composition, appearance, and properties as the artificial product known as blue vitriol.

CHALCE'DON, or **CALCHE'DON** (Lat., from Χαλκηδών, *Chalkēdōn*, or Καλχηδών, *Kalchēdōn*). A city of ancient Bithynia, at the entrance of the Bosporus, opposite Byzantium. It was founded about 677 B.C. by a colony from Megara and soon became a place of considerable trade and importance. It contained several temples, one of which, dedicated to Apollo, had an oracle. After the liberation of the Greek cities from Persian rule, Chalcedon joined the Athenian League, but at the end of the Peloponnesian War came into possession of the Spartans. With the rest of Bithynia, it was bequeathed to the Romans by King Nicomedes III. (See BITHYNIA.) During the Mithridatic War it was the scene of a bold exploit of the Pontic sovereign. Bithynia having been invaded by Mithridates, all the wealthy Romans in the district fled for refuge to Chalcedon, whereupon he broke the chains that protected the port, burned four ships, and towed away the remaining 60. Under the Empire Chalcedon was made a free city, and it was the scene of a general council, held 451 A.D. Chosroës II, King of Persia, captured it 616 A.D., after which it declined, until it was finally demolished by the Turks, who used its ruins to build mosques and other edifices in Constantinople. Chalcedon was the birthplace of the philosopher Xenocrates.

The Council of Chalcedon, to which allusion has been made, was the fourth general council, and was assembled by the Emperor Marcian for the purpose of drawing up a form of doctrine in regard to the nature of Christ, which should equally avoid the errors of the Nestorians (q.v.) and those of the Monophysites (q.v.). Six hundred bishops, almost all of the Eastern or Greek church, were present. The doctrine declared to be orthodox was that in Christ there were two natures, which could not be intermixed (this clause was directed against the Monophysites), and which also were not in entire separation (this was directed against the Nestorians), but which were so conjoined that their union destroyed neither the peculiarity of each nature nor the oneness of Christ's person.

CHALCEDONY, kăl-sĕd'ō-nĭ (Lat. *chalcedonius*, a gem named after Gk. Χαλκηδών, *Chalkēdōn*, a city in Asia Minor, where it abounded, Gk. χαλκηδών, *chalkēdōn*, chalcedony). A crystalline variety of quartz of various shades of white, yellow, brown, green, and blue. It is transparent or translucent, and some of the milk-white varieties are opaque. It occurs in mammillary, botryoidal, and stalactitic shapes, and as a lining or filling of cavities in rocks. The principal varieties of chalcedony are *agate*, which is banded and striped; *carnelian*, which is clear and of various shades of red; *chrysoprase*, an apple-green variety, in which the color is due to nickel oxide; *heliotrope* or *bloodstone*, of a dark-green color, with small spots of jasper; *onyx*, consisting of bands of different colors, usually black and white; *plasma*, of a deep-green color; and *sardonyx*, a red-banded variety of onyx, all of which are described in special articles under their names. The variety of its colors and the high lustre that it takes by polishing render chalcedony valuable for brooches, necklaces, and other ornaments, and some varieties of it are cut as seal stones. Chalcedony is found in Great Britain, in Brazil, and in a number of localities in Colorado and California. The formation of the famous agatized wood of Chalcedony Park, Ariz., is caused by a natural replacement of the woody fibre by chalcedony from siliceous waters.

CHALCEDONYX, kăl-sĕd'ō-nĭks (from Gk. χαλκηδών, *chalkēdōn*, chalcedony + ὄνυξ, *onyx*, finger nail, onyx, Lat. *onyx*. See CHALCEDONY). A variety of agate consisting of alternate layers of a white opaque and a grayish translucent chalcedony.

CHALCHIHUITL, chăl'chē-wē't'l (Mexican). A green mineral referred to by Spanish writers contemporary with Cortés. It was held in high repute by the ancient Mexicans, who valued it more than gold. The Mexicans believed that the art of cutting and polishing chalchihuitl had been taught them by the god Quetzalcoatl. The best authorities believe the mineral to have been the bluish-green variety of turquoise from Los Cerillos mines, New Mexico, although some still think it is a variety of jadeite. A blue calamine from Chihuahua, Mexico, has recently been claimed to be chalchihuitl.

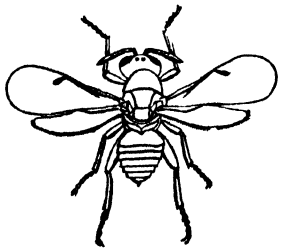
CHALCIDICE, kăl-sĭd'ĭ-sē (Lat., from Gk. Χαλκιδική, sc. χώρα, *chōra*, district, *Chalkidikē*, of Chalcis). The ancient name of three districts in Grecian or partly Grecian lands. 1. In Eubœa, the land belonging to the inhabitants of the town of Chalcis, on the southwestern side of the island, near the Strait of Euripus. (See CHALCIS.) 2. A district of Macedonia, between the Thermaic and the Strymonic gulfs (Map: Greece, Ancient, C 1). The lower part of this district forms three peninsulas, called, from west to east, Pallene (or, more anciently, Phlegra), Sithonia, and Acte or Athos. This district received its name from Chalcis, in Eubœa, having been settled in the eighth century B.C. by colonists from that place. Among the flourishing towns of Chalcidice were Olynthus and Potidæa. 3. A district in Syria, extending eastward from the Orontes River to the desert, and called Chalcidice from the town of Chalcis, lying therein.

CHALCIDIDÆ. See CHALCIS FLIES.

CHALCIS, kăl'sĭs (Lat., from Gk. Χαλκίς, *Chalkis*). The capital of the island and the Nomarchy of Eubœa, Greece, situated on the Euripus, the strait which separates the island from Bœotia (Map: Greece, E 3, and Ancient Greece, C 2). The Euripus is divided into two channels, of unequal breadth and depth, by a rock which is

surmounted by a castle, partly of Venetian and partly of Turkish construction. A shallow channel, 85 feet wide, separates the rock from Bœotia and is crossed by a stone bridge. The main channel, about 120 feet wide, through which a strong current flows, was at one time crossed by a drawbridge, which has been removed in modern times in connection with operations for widening and deepening the channel. The site seems to have been occupied in very early times, and during the ninth and eighth centuries B.C. the inhabitants were active colonizers, especially towards the north, where they gave their name to the Chalcidian Peninsula on the Macedonian coast. (See CHALCIDICE, 2.) They also appear early as allies of the Corinthians in the Greek colonization of Italy and Sicily, where they settled Cumæ and Naxos, and gave their alphabet to the Italians, via Cumæ (q.v.). After a long war with its rival, Eretria, Chalcis acquired the undisputed headship of Eubœa and rapidly rose to wealth and importance. Its government was strongly aristocratic, but after a crushing defeat at the hands of the Athenians (506 B.C.) the nobles were driven out and a democracy established. It subsequently fell under the power of the Macedonians and the Romans and was at this time a place of great military importance, nearly 9 miles in circumference, and had many fine temples, theatres, and other public buildings. The orator Isæus and the poet Lycophron were born at Chalcis; Aristotle died there. In the Middle Ages it was prosperous under the Venetians, who held it for nearly three centuries, until its conquest by the Turks in 1470. Not many ancient remains now exist. The streets are narrow, but the houses, many of which owe their origin to the Venetians, are substantial and spacious. It suffered from an earthquake in 1894. Pop., 1896, 8661; (commune), 15,989; 1907, 19,950.

CHALCIS (kăl'sĭs) **FLIES,** or **CHALCIDIDÆ,** kăl-sĭd'ĭ-dē (Neo-Lat. nom. pl., from Gk. *χαλκίς, chalkis,* lizard, either from Χαλκίς, *Chalkis,* a city of Eubœa, or, more probably, like the name of the town itself, from *χαλκός, chalkos,* copper). A group of very small Hymenoptera, characterized by elbowed feelers. They number thousands of species and are truly parasitic, except a few gall-making and seed-feeding genera. One large section glues its eggs upon the backs of caterpillars of moths. These eggs hatch in about two days, when the grubs quickly bury their heads in the skin of their host and begin to feed, growing more rapidly than any other known insect larvæ, and reaching full growth within three or four days. The first to mature then withdraws its head, preparatory to pupating—an act which at once causes the death of the exhausted caterpillar and consequently of many belated grubs. The more advanced survivors spin and attach their cocoon to the underside of the empty skin of the dead host, which thus furnishes a roof, and within about eight days complete their transformation and emerge as adult chalceids. The fact that they attack many fly maggots, caterpillars, etc., greatly injurious to cultivated plants, and destroy them with much speed and certainty, places them among the most valuable aids mankind has in its warfare against insect pests. It is due to these insects, principally, that the cotton worm of the South is kept down, and millions of dollars' worth of cotton saved each year. "Nowhere in Nature," remarks L. O. Howard, "is there a more marked example of the correlation between structure and habits than occurs in this family. . . . So that it is possible for an experienced person, on seeing a new species of chalcis fly, to tell precisely what kind of insect it will be found parasitic upon." See Howard, *The Insect Book* (New York, 1901); also papers, often illustrated, by Howard and Ashmead, in the publications of the United States National Museum and Department of Agriculture.



CHALCIS FLY.

CHAL'COCITE. A copper sulphide occurring in crystals of the orthorhombic system, but more frequently met with in granular or compact masses. The lustre is metallic, and the color lead gray, which tarnishes to dull black on exposure. Chalcocite occurs commonly associated with other copper minerals, as in the Cornwall mines, where beautiful specimens are found. It also occurs in Bohemia, Saxony, Mexico, South America, and at Bristol, Conn. See COPPER.

CHALCOGRAPHY, kăl-kŏg'rà-fĭ (from Gk. *χαλκός, chalkos,* copper + *γράφειν, graphein,* to write). A modern term used to signify engraving on copper and steel plates. It is more properly called "line engraving" (q.v.).

CHALCONDYLAS, kăl-kŏn'dĭ-las, or **CHALCON'DYLES,** DEMETRIUS (c.1424 c.1511). A Greek scholar. He was born in Athens, and after teaching Greek in various cities of Italy, from 1447 onward, was called by Lorenzo de' Medici to the chair of Greek in Florence (1471), where Pope Leo X was one of his pupils. After the death of the Prince (1492), he was professor of Greek in Milan, where he died. Chalcondylas wrote a Greek grammar, entitled *Erotemata* (c.1493), worked out in the form of questions and answers, and published editions of Homer (1488), of Isocrates (1493), and of the *Lexicon* of Suidas (1499). Consult Hody, *De Græcis Illustribus* (London, 1742).

CHALCOPYRITE, kăl'kō-pī'rĭt (from Gk. *χαλκός, chalkos,* copper + *πυρίτης, pyritēs,* flint, from *πῦρ, pyr,* fire), commonly called COPPER PYRITES. A copper-iron sulphide that crystallizes in the tetragonal system. It has a metallic lustre, is of a brass-yellow color, and is often tarnished or iridescent. It occurs widely disseminated in metallic veins and in the older rocks, frequently with pyrite or iron sulphide, and sometimes with nickel and cobalt sulphide. This mineral occurs in large deposits in Sweden, in the Harz Mountains, in Bohemia, Hungary, New South Wales, and in South Africa. In the United States it is found quite largely in Colorado, Montana, Arizona, Utah, and California, where it frequently carries gold and silver. It is also found in Vermont, Tennessee, and North Carolina, and is here mined as a copper ore. When tarnished, it is sometimes called *peacock ore,* owing to the iridescent film of brilliant colors with which it becomes coated.

CHALDÆA, kăl-dē'à. See BABYLONIA.

CHALDÆAN (kăl-dē'an) **RITE,** CHRISTIANS OF THE, also called SYRO-CHALDÆANS, or SYRO-ORIENTALS. A branch of the Nestorians who

acknowledge the Pope of Rome. They use the Eastern rite and are under the Patriarch of Babylon, usually residing at Mosul. Their number is estimated at about 66,000. See NESTORIANS.

CHALDÆANS (from Lat. *Chaldæi*, Gk. Χαλδαῖοι, *Chaldaioi*, Heb. *Kasdîm*, Assyr. *Kaldi*). Properly a designation of a Semitic people, whose original home was southeast of Babylonia, on the Persian Gulf, in the Sea Land (Mat Tamti). There was a considerable number of Kaldu states, such as Bit Ammukani, Bit Dakan, Bit Shilani, Bit Shaali, and Bit Yakin. Of these the most important seems to have been Bit Yakin. Hommel's theory that Ur (Muḳḳayar) belonged to the realm of the Kaldu as early as the third millennium B.C. is not convincing. It is possible that already the Pashe dynasty (1185–1051) was Chaldæan. In the case of Mat Tamti (1051–1030) and Bit Bazi (1030–1010), this is quite probable. Adadnirari III, in 803, received tribute from Kaldu princes. In 723 Ukinzir, of Bit Ammukani, consequently a Chaldæan, ascended the throne of Babylon. Marduk-apaliddin (Merodach Baladan), ruler of Bit Yakin, made himself King of Babylon in 721 and maintained himself with the aid of Elamites and Aramæans until 709. In 702 he returned for nine months, but was driven back to Bit Yakin by Sennacherib. In 693–689 another Chaldæan, Mushezib Marduk, occupied the throne of Babylon. But it was with Nabuapaluzur (Nabopolassar) (625–604) and Nabukuduruzur (Nebuchadnezzar), his son (604–562), that Chaldæan princes seated themselves upon this throne who were able to make Babylonia a world power. Nabukuduruzur's son, Amil Marduk (Evil Merodach), who reigned 562–560, was overthrown by Nergalsharuzur (560–556), and the son of this usurper, Labashi Marduk (556), was the last Chaldæan King. He was supplanted by a Babylonian, Nabunaid (Nabonidos), who reigned 556–549. The period of foreign conquests and a powerful inner administration had made the terms "Chaldæan" and "Babylonian" practically synonymous with foreigners. Hebrew writers of the postexilic period speak of the Babylonians as Chaldæans (Kasdim). In the second century B.C. the term "Chaldæan" was used by the author of the Book of Daniel as a designation of a class of magicians. Concerning the Chaldæan language we have no other information than that which may be gleaned from proper names. These suggest a closer kinship to the Babylonian than to either Arabic or Aramaic. After the conquest of Babylon the native Chaldæan dialect was no doubt crowded out by Babylonian and Aramaic. The latter was regarded by the author of Dan. ii. 4a not altogether erroneously as the "language of the Chaldæans," though the language of the following chapters is not the East Aramaic spoken in Babylonia to some extent, but the Judæan dialect. (See DANIEL, BOOK OF.) Hence Aramaic was called "Chaldee" by Jerome, and the confusing term has remained in use until recent times. The failure to distinguish between Babylonians and Chaldæans has added to this confusion. It is probable that the Chaldæan system of astronomy and astrology was developed by this people in Babylonia, on the basis of earlier observations in the beginning of the first millennium B.C. The Chaldi, a people related to the modern Georgians of the Caucasus, were called by the old geographers "Pontic Chaldæans," but they were Chaldæans in name only and non-Semitic. (See CHALDIANS.) Consult: Delattre, "Les Chaldéens," in *Revue des questions historiques* (Paris, 1896); Winckler, *Untersuchungen zur altorientalischen Geschichte* (Leipzig, 1889); Brinton, *Protohistoric Ethnography of Western Asia* (Philadelphia, 1895); Ed. Meyer, *Geschichte des Altertums*, i, 2, pp. 434, 592 ff. (3d ed., 1913).

CHALDEE PARAPHRASE. See TARGUM.

CHALDIANS, kăl'dĭ-anz (Gk. Χαλδαῖοι, *Chaldaioi*, Χάλδοι, *Chaldoi*, Lat. *Chaldi*). A people inhabiting Armenia before the arrival of the Haik. The early Assyrian kings called this country Nairi. It was then inhabited by petty nomadic tribes of uncertain ethnic relation. About 900 B.C. the Chaldians seem to have entered the country from the northeast and founded a powerful kingdom. The name by which they designated themselves, and the land which they conquered, was that of their chief god, Chaldis. It is impossible as yet to determine to what family of nations they belonged. But a connection may be suspected with such people as the Mushki, Kashki, Tabal, Kummuch, and Chatti. The Assyrians, from the time of Asurnazirpal III (885–860), called them Urartu, which may have been the name of the first tribe or district with which they became acquainted. It is possible that Aramæ, against whom Shalmaneser III (860–825) fought in 857 and 845 B.C., was the first Chaldian King who succeeded in uniting under his sceptre the territory around Lake Van. In 833 Shalmaneser III warred with a Sarduris, who is possibly to be identified with the Sarduris, son of Lutipris, of whom three inscriptions in Assyrian have been found. These agree most closely with the Assyrian inscriptions of the time in form and character. Ispuinis, who is called Ushpina by Samsi Adad V (825–812), associated with himself his son, Menuas. It is possible that Ispuinis was the conqueror and organizer of the territory of Biaina and that he made Tuspas the capital. Menuas is known to us chiefly through his building enterprises. The canals he constructed reveal the great architectural skill of the builders and their remarkable knowledge of hydraulics. They also show the great extent of territory and large resources of the King. In 802, 792, and 785 Adad Nirari V (812–783) made campaigns against Menuas. About 80 inscriptions in the Chaldian language of this King have been found. Argistis (785–760), a great conqueror, further extended the boundaries of Chaldia. He left a long inscription on the rock of Van and many others. In vain Shalmaneser IV (783–773) repeatedly invaded his territory. He was defeated, and the power of the Chaldian King grew apace. Sarduris II (760–730) appears to have a right to call himself "King of Kings," as he was the actual liege lord over Melitene, Commagene, Arpad, Cilicia, and some adjoining districts. Owing to the weakness of Assyria during the generation from Shalmaneser IV to Tiglath-pileser IV, Chaldia became quite the most important power in western Asia. In the struggle for empire between Chaldia and Assyria Tiglath-pileser III (745–728) was able in 735, by an expedition into the very heart of Chaldia, to establish the Assyrian power in Asia by greatly weakening the rival state, yet was obliged to retire without being able to capture the impregnable capital. The final struggle between Rusas I (730–712) and Sargon II (722–705) ended in the loss of

Chaldian supremacy. The Assyrian reports are indeed wrong in stating that Rusas committed suicide. He was even able to extend his power somewhat after the alleged defeat, north and east. But in the west and the south Assyria had effectually checked the growth of Chaldia. And towards the end of Sargon's reign the Kimmerians fell upon Chaldia from the north. This invasion Argistis III, mentioned by Sargon in 709, or his successor, Rusas II, seems to have still been in a position to repulse. But their territory unquestionably suffered much. Internally these reigns are marked by great advance in architecture, sculpture, and other arts. Rusas II built an important residence city at Toprakkaleh, near Van, called Rusachina, the ruins of which have been excavated. Erimenas is known only as the father of Rusas III, who appears to have been the father of Sarduris III, mentioned in an inscription of Asurbanipal (668–625) as having finally submitted to Assyrian suzerainty. If this is more than a vain boast, it may mean that the Scythians (Ashkuza), having established themselves in the territory of the Mannai and become allies of the Assyrians about 630, forced their western neighbors to seek safety from repeated raids in acknowledging Assyrian authority. It is possible that, with the fall of the Scythian power through the Medes, the Chaldians also were incorporated in the Median Empire immediately before or soon after the destruction of Nineveh, in 606. The invasion of the Haik, the modern Armenians, in the sixth century B.C., drove the Chaldians into exile. While the Assyrian form of the name survived in the biblical Ararat (Gen. viii. 4; Jer. li. 27; 2 Kings xix. 37; Isa. xxxvii. 38) and in the Alarodioi, who, according to Herodotus, served in the army of Xerxes, the name "Chaldian" has been preserved in the Chaldaioi of Sophocles, Xenophon, Strabo, and Plutarch, in the Chaldoi and the theme Chaldia of Byzantine times, in numerous place names, and in the Armenian Chaltiq. The Chaldians are also identical with the Χάλυβες, *Chalybes*, of the Greeks, as Lehmann-Haupt has shown. Possibly there is even a remnant of the old Chaldians in Chalt, near Baiburt.

The Chaldians worshiped as their highest god Chaldis, by the side of him Ardinis, a sun god, and Teisbas, a storm god, as well as a host of minor deities conceived as the sons of Chaldis. Their civilization was no doubt borrowed from Assyria, but in some respects advanced beyond the point reached by the Assyrians themselves. They were probably the discoverers of the methods of ironworking, for which the region became famous among the Greeks. Unlike the Assyrians, they erected their buildings of massive walls of stone. The country was intersected with fine roads and canals, showing great technical knowledge. Their sculptures are more lifelike than the Assyrian. They excelled in mosaics, filigree work, and ceramics.

The Chaldian language was written in cuneiform characters, borrowed from the Assyrian, but simplified by giving only one value to each sign, avoiding signs representing closed syllables, and using as a rule separate signs for the vowels, thus made to approach to a purely alphabetical system. The family to which it belongs has not been determined. It has some affinity with the Georgian and may belong to the same group as Mitannian, Hittite, and some early Asianic languages. Nearly 200 native inscriptions have been discovered in all parts of modern Armenia, presenting some dialectical differences. They were first studied by Schultz and Hincks, who worked out the general idea with the aid of Assyrian ideographs. Guyard first noticed the identity of the imprecations at the end of the inscription with those found on Assyrian documents. Sayce established the main outlines of the grammar. D. H. Müller cleared up many difficulties. Belck and Lehmann discovered most of the inscriptions, and Sandalgian has brought them together in a corpus.

Bibliography. A good account of the Chaldians is found in Maspero, *The Passing of the Empires* (London, 1899). Consult: Sayce, in *Journal of the Royal Asiatic Society*, xiv–xx (London, 1882–94); Belck and Lehmann, *Zeitschrift fur Ethnologie* (Berlin, 1892 et seq.); id., in *Zeitschrift fur Assyriologie* (Leipzig, 1892 et seq.) and in *Verhandlungen der Berliner anthropologischen Gesellschaft* (Berlin, 1892 et seq.); Müller, *Die Keilinschrift von Aschrut Dagh* (Vienna, 1890); Nikolsky, *Les inscriptions cunéiformes de Koclani Girlan* (1893); Olmstead, in *American Journal of Semitic Languages* (Chicago, 1901); Lehmann-Haupt, "Materialien zur alten Geschichte Armeniens und Mesopotamiens," in *Abhandlungen der Gott. Ges.* 1907); id., *Armenien einst und jetzt* (1910); Bagel, "Vorarmenische Keilinschriften," in *Der Zeitgeist* (1912); Ed. Meyer, *Geschichte des Altertums*, i, 2, pp. 698 f. (3d ed., 1913).

CHÂLET, shȧ'lȧ' (from ML. *castelletum*, dim. of *castellum*, fort, castle, from *castrum*, fort). The French-Swiss name for the wooden summer hut of the Swiss herdsmen on the mountains; but the term is also extended to include Swiss houses generally as well as picturesque and ornate villas built in imitation of them.

CHALEURS BAY, or **BAIE DES CHALEURS,** bȧ dȧ shȧ'lĕr' (Fr., bay of heat). An inlet on the west side of the Gulf of St. Lawrence, which partly separates New Brunswick from Quebec (Map: Newfoundland, D 5). It is about 85 miles in length from east to west and has a maximum width of over 20 miles. While its depth is only about 250 feet in the channel, yet a depth of 100 feet is found quite near the shore, thus affording commodious anchorage and easy access to the land. Chaleurs Bay receives numerous small streams, chief of which are the Nepisiguit River from the south and the Patapedia River from the west. Fishing is the chief industry. A number of towns skirt the shore. Chaleurs Bay receives its name from Jacques Cartier, who entered it in the hottest month of 1535.

CHALICE, chăl'ĭs (Fr. *calice*, It. *calice*, AS. *calic*, Ger. *Kelch*, OHG. *chelih*, from Lat. *calix*, Skt. *kalaśa*, cup). This ancient name for a drinking cup has been retained for the vessels used for the wine in the holy sacrament. Some of the earliest were made of wood or horn; others, of which there are some superb Byzantine examples, of glass, crystal, or agate. But on account of their fragility, these materials fell into general disuse in favor of precious metals; and most mediæval, Renaissance, and modern chalices are of gold, silver gilt, or silver, often decorated with enamels and set with precious stones. They were among the objects on which the goldsmith lavished the greatest care. Many examples remain in industrial and other muse-

ums and in church treasuries throughout Europe; in some cases small parish or cathedral churches have preserved their old pieces more carefully than have the larger institutions.

There were two classes of chalices: the ordinary chalice, used by the priest at the altar, and the ministering chalice, for the communion of the congregation. (See COMMUNION IN BOTH KINDS.) The latter was larger and frequently had two handles. The chalice always consisted of three parts—a bowl, a long neck, and a foot. It varied very much in shape. The earliest (fourth to eighth century) had a deep, slender bowl, which became broader and more semicircular in the Romanesque age, and then changed radically during the Gothic period, passing first to a broader flat bowl, with enlarged foot, and then to a conical, tunnel-shaped bowl with longer neck, often broken with bulbs. The bowl itself, which was originally the most decorative part, tended to become the simplest with smooth surface. The chalice is the symbol of St. John the Evangelist. Consult Giefers, *Ueber den Altarkelch* (Paderborn, 1856), and Corblet, *Histoire du sacrement de l'Eucharistie* (Paris, 1885).

CHALK (AS. *cealc*, Ger. *Kalk*, Fr. *chaux*, Ir. *caile*, from Lat. *calx*, lime). A soft, earthy variety of limestone or carbonate of lime, which often forms beds of great thickness and extent. It is usually yellowish or white in color, has an earthy texture, is rough to the touch, and adheres slightly to the tongue. The average chemical composition is about that of English chalk —calcium carbonate, 97.90 per cent; silica, 0.66 per cent; magnesium carbonate, 0.10 per cent; ferric oxide, 0.35 per cent.

Chalk is formed by the accumulation on the ocean bottom of the tiny shells of Foraminifera, fragments of molluscan shells, sea-urchins' spines, and sponge spicules, which can be seen under the microscope. It is very abundant in certain areas and also in certain geological formations, the Cretaceous system being so named on account of the thick and extensive deposits of chalk which it contains. These deposits are especially abundant in England and France, where the great white cliffs of chalk on both sides of the English Channel, notably in the vicinity of Dover, England, and Dieppe, France, are conspicuous objects. In the United States chalk is known to occur in the Cretaceous formation of Iowa, in the Tertiary of Texas and Arkansas, and in other States.

Chalk is not much used as a building stone, chiefly because of its low resistance to the weather. In England some of the harder beds are occasionally employed for structural purposes. It is burned to lime, and the mortar is used generally in the construction of buildings in London. In England chalk has been used for many years as an ingredient of Portland cement, and more recently the Arkansas chalk has been employed for the same purpose. When ground and mixed with water it forms "whitewash." If the ground material is freed from grit by washing, it is known as "whiting," which is used for cleaning silver and making putty. "Gilder's white" and "Paris white" are forms of the same material which have been more carefully washed. On account of its color and softness, it finds general application as a marking material, but when so used has to be mixed with some bonding substance. (See CRAYON.) Like lime and gypsum, chalk is used in farming to ameliorate the texture of the soil. In a purified condition it is administered as medicine to correct acidity of the stomach. The flint concretions so abundant in the chalk of Europe are used for pebbles in ball mills. See CRETACEOUS SYSTEM; SOIL; PORTLAND CEMENT; LIME.

CHALK, BLACK. See CRAYON.

CHALK FORMATION. See CRETACEOUS SYSTEM.

CHALKIS. See CHALCIS.

CHALLEMEL-LACOUR, shâl'mĕl' là'kōōr', PAUL AMAND (1827–96). A French publicist and politician. He became professor of philosophy at the Lyceum of Pau in 1849, and at the time of the coup d'état, while holding a similar position at the Lyceum of Limoges, was arrested because of his pronounced Republican opinions. After a few months of imprisonment he was expelled from France. He went to Belgium, where he lectured on literature, and thence to Germany and Italy. In 1856 he became professor of French literature at the Polytechnic Institute of Zurich, and in 1859, being amnestied, returned to France. He soon became known as one of the ablest contributors to the *Temps*, the *Revue Moderne*, and other influential journals. For a short time he was editor of the *Revue des Deux Mondes*. After the fall of the Second Empire he became Prefect of the Department of the Rhône. He was elected deputy (1872), senator (1876), President of the Senate (1893). He was, from 1880 to 1882, Ambassador to England, and became Minister of Foreign Affairs in 1883. In 1893 he was elected a member of the French Academy. He translated Ritter's *Geschichte der Philosophie* (1861) and *La philosophie individualiste: étude sur Guillaume de Humboldt* (1864), and edited, in 1869, the *Works* of Madame d'Epinay, the friend of Rousseau. In 1897 appeared *Œuvres oratoires de Challemel-Lacour*, edited by Joseph Reinach. His essays were collected as *Etudes et réflections d'un pessimiste* (1901).

CHALLENGE (OF. *chalenge, chalonge*, It. *calogna*, accusation, from Lat. *calumnia*, false accusation, from *calvi*, to deceive). In English and American law, the criminal offense of inciting another to fight with deadly weapons. No set phrase or form of words is necessary to constitute a challenge. Any language which, when connected with the circumstances of a quarrel and the conduct of the parties, shows an intention to invite or solicit a meeting in order to fight with deadly weapons, amounts to a challenge. Giving a challenge, or knowingly bearing one, or even inciting to a challenge, is a criminal offense at common law. The tendency of modern statutes is to subject all persons connected with a challenge to severe criminal punishment and to disqualify them from holding public office thereafter. See DUELING.

In civil and criminal procedure, a formal exception taken to one or more persons summoned to serve as jurors. When exception is taken to the entire panel, it is called a challenge *to the array*, or *to the panel*, or a motion to set aside the panel, or to quash the array. A challenge is said to be *for cause* when it is based upon a state of facts which, if established, renders the juror incompetent, as that he is pecuniarily interested in the case, or disqualified by reason of age, sex, or mental condition. A challenge is said to be *to the favor* when founded on a charge that the juror is biased or subject to some improper influence. A *peremptory* challenge is one for which no reason need be

assigned. The number of peremptory challenges allowable in civil or criminal cases is regulated by statute. Challenges are to be made after the appearance of the jurors and before they are sworn. For further particulars, see JURY.

CHAL'LENGER EXPEDI'TION. A scientific exploration of the open sea sent out by the British government in 1872–76. In 1872 the *Challenger*, a corvette of 2306 tons, was completely fitted out and furnished with every scientific appliance for examining the sea from surface to bottom, e.g., with natural-history workroom, chemical laboratory, and aquarium. The ship was placed in charge of a naval surveying staff under Captain Nares and of a scientific staff, with Prof. Wyville Thomson at their head, for the purpose of sounding the depths, mapping the basins, and determining the physical and biological conditions of the Atlantic, the Southern, and the Pacific oceans. During three and a half years the *Challenger* cruised over 68,900 nautical miles. Investigations were made at 362 stations, at each of which were determined the depth of channel, the bottom, surface, and intermediate temperatures, currents, and fauna, and the atmospheric and meteorological conditions. The route was by Madeira, the Canaries, the West Indies, Nova Scotia, Bermudas, Azores, Cape Verde, Fernando Noronha, Bahía, Tristan d'Acunha, Cape of Good Hope, Kerguelen, Melbourne, the China Sea, Hongkong, Japan, Valparaiso, Straits of Magellan, Montevideo, Vigo, and Portsmouth. Between the Admiralty Islands and Japan the *Challenger* made her deepest sounding, 4575 fathoms. Consult Wyville Thomson and Dr. John Murray, editors of the copious *Reports on the Scientific Results of the Voyage of H. M. S. Challenger* (50 vols., London, 1880–95). They fall into a *Narrative* (2 vols., 1882–85); *Zoology* (30 vols., 1880–89); *Physics and Chemistry* (3 vols., 1884–89); *Botany* (1885–86). A popular narrative of the cruise is Moseley's *A Naturalist on the Challenger* (London, 1879).

CHAL'LIS, JAMES (1803–82). An English astronomer. He was born at Braintree, Essex, and was educated at Trinity College, Cambridge. He became a fellow of his college in 1826 and Plumian professor of astronomy and experimental philosophy at Cambridge in 1836 and from then until 1861 was also director of the Cambridge Observatory. His labors were directed principally to the determination of the positions of sun, moon, and planets, with the object of increasing tabular accuracy. Among the valuable improvements devised by him were the collimating eyepiece, the transit reducer, and the meteoroscope. In addition to 225 contributions to scientific publications, he published several independent works on astronomy, mathematics, and physics.

CHAL'LONER, RICHARD (1691–1781). An English Catholic prelate, born at Lewes, Sussex. He was the son of a dissenter, but was brought up among Roman Catholics and sent to an English college at Douai, where he finally became professor of divinity and vice rector. In 1730 he joined the English Mission in London, and on the death of Dr. Benjamin Petre, in 1758, he became vicar apostolic of the London district. During much of his residence he was subjected to persecutions. He was the author of numerous controversial and devotional works, the most popular one being *The Garden of the Soul* (1740), which has been translated into various languages and continues to be the most popular prayer book among English Catholics. As an antidote to Foxe's well-known *Book of Martyrs*, he wrote *Memoirs of Missionary Priests and Other Catholics of Both Sexes that Have Suffered Death in England on Religious Accounts* (1741–42). He published a version of the Douai Bible, which is substantially that used by English-speaking Catholics, and the lives of English, Scottish, and Irish saints under the title of *Britannia Sancta*. For his *Life*, consult Barnard (1784) and Burton (London, 1909).

CHALMERS, chä'mĕrz *or* cha'merz, ALEXANDER (1759–1834). A Scottish biographer and editor. He was educated in Aberdeen and early in life edited several newspapers in London, besides contributing to periodicals, but he devoted himself chiefly to writing prefaces for new editions of English classics. Of the many works edited by him, *The British Essayists*, in 45 volumes, is still regarded as useful. His fame rests more particularly on his *General Biographical Dictionary* (32 vols., 1812–14), in which, however, the various articles are for the most part long and tedious and lacking in research and accuracy.

CHALMERS, GEORGE (1742–1825). A Scottish antiquarian and historian, born at Fochabers in the County of Moray. He was educated in Aberdeen, studied law in Edinburgh, emigrated to America in 1763, and practiced law in Baltimore until the Revolution. Being a Loyalist, he then returned to Great Britain, and from 1786 until his death was chief clerk of the Board of Trade. He wrote a number of works on the Colonies, and biographies of De Foe, Thomas Paine, and Mary, Queen of Scots; but his most important work is *Caledonia: An Account, Historical and Topographical, of North Britain* (1807–24), which displays profound research into the history of Scotland and is not yet entirely superseded.

CHALMERS, GEORGE PAUL (1836–78). A Scottish landscape, genre, and portrait painter. He was born in Montrose and studied at the Trustees School in Edinburgh under Scott Lauder. In 1871 he was elected to the Royal Scottish Academy. His landscapes, such as "The End of the Harvest" (1873) and "Rain in Shchagan" (1878), are fine examples of mood painting. They are rich and beautiful in color and prove Chalmers to be one of the most important precursors of modern Scottish landscape painting. His greatest achievement, "The Legend" (Edinburgh), executed in the manner of Josef Israels, was unfinished at the time of his violent death. Among his genre pictures "The Prayer" is especially popular, and of his portraits that of J. C. Bell (1870) is of exceptional merit. Consult his biography by Pinnington (Glasgow, 1897), and Caw, *Scottish Painting* (Edinburgh, 1908).

CHALMERS, THOMAS (1780–1847). A Scottish theologian. He was born in Anstruther, Fifeshire, Easter Day, March 17, 1780, educated at the University of St. Andrews, and in his nineteenth year licensed to preach the gospel. In 1803 he was ordained minister of the parish of Kilmany, in Fifeshire, near St. Andrews. At this period his attention was entirely absorbed by mathematics, political economy, and natural philosophy, to the neglect of the studies appertaining to his profession. But personal illness, new anxieties, the reading of Wilberforce's *View of Practical Religion*, and thought required

for his article on Christianity for Brewster's *Edinburgh Encyclopædia* (1810) awakened his dormant spiritual nature, and he grew earnest, eloquent, devout, and faithful to his pastoral duties. In July, 1815, he was translated to the Tron church and parish, Glasgow, where his magnificent oratory took the city by storm. His *Astronomical Discourses* (1817) had a prodigious popularity. During the same year he visited London, where his preaching excited as great sensation as at home. But Chalmers's energies could not be exhausted by mere oratory. Discovering that his parish was in a state of great ignorance and immorality, he began to devise a scheme for overtaking and checking the alarming evil. It seemed to him that the only means by which this could be accomplished was by "revivifying, remodeling, and extending the old parochial economy of Scotland," which had proved so fruitful of good in the rural parishes. In order to wrestle more closely with the ignorance and vice of Glasgow, Chalmers, in 1819, became minister of St. John's parish, "the population of which was made up principally of weavers, laborers, factory workers, and other operatives." Of its 2000 families, more than 800 had no connection with any Christian church and the children were growing up in ignorance. He broke up his parish into 25 districts, each of which he placed under separate management, and established two week-day schools and between 40 and 50 local Sabbath schools, for the instruction of the "poorer and neglected classes," more than 1000 of whom attended. In a multitude of other ways he sought to elevate and purify the lives of his parishioners. See Chalmers's *Christian and Civic Economy of Large Towns* (3 vols., 1821–26). His plan of parochial work carried out in Glasgow, although abandoned soon after its inception and not elsewhere imitated, may be called the suggestion of the modern method of dealing with the dependent classes, as seen in the charity organization societies and in settlement work. His parental relation to these movements has received recognition in the condensed edition of his *Christian and Civic Economy*, by Prof. C. R. Henderson (New York, 1900), and in a similar work published in London in the same year, *Chalmers on Charity, a Selection of Passages and Scenes to Illustrate the Social Teaching and Practical Work of Thomas Chalmers*, edited by N. Masterman.

But such herculean toils began to undermine his constitution, and in 1823 he accepted the offer of the moral philosophy chair in St. Andrews, where he wrote his treatise on the *Use and Abuse of Literary and Ecclesiastical Endowments* (1827). In 1828 he was transferred to the chair of theology in Edinburgh, and in 1832 published a work on political economy in connection with the moral state and moral prospects of society. In 1833 appeared his Bridgewater treatise, *On the Adaptation of External Nature to the Moral and Intellectual Constitution of Man*. It was received with great favor, and obtained for the author many literary honors, the Royal Society of Edinburgh electing him a fellow, and the French Institute a corresponding member, while the University of Oxford conferred upon him the degree of D.C.L. In 1834 he was appointed convener of the church-extension committee; and after seven years of enthusiastic labor announced that upward of £300,000 had been collected from the nation and 220 new churches built. Meanwhile, however, troubles were springing up in the bosom of the church itself. The evangelical party had become predominant in the General Assembly, and came forward as the vindicators of popular rights; the struggles in regard to patronage between them and the "moderate" or "Erastian" party became keener and more frequent, until the decision of the civil courts in the famous "Auchterarder" and "Strathbogie" cases brought matters to a crisis; and on May 18, 1843, Chalmers, followed by 470 clergymen, left the church of his fathers, rather than sacrifice those principles which he believed essential to the purity, honor, and independence of the church. (See PRESBYTERIANISM.) The rapid formation and organization of the Free church were greatly owing to his indefatigable exertions, in consequence of which he was elected principal of the Free Church College and spent the close of his life in the zealous performance of his duties and in perfecting his *Institutes of Theology*. He died suddenly at Morningside, Edinburgh, May 30, 1847.

The works of Chalmers contain valuable, and in some cases original, contributions to the sciences of natural theology, Christian apologetics, and political economy, while on minor topics, such as the church-establishment question, they exhibit both novelty and ingenuity of argument. As an orator, Chalmers was unique and unrivaled. His works were collected (23 vols., 1836–42); posthumous works (9 vols., 1847–49); select works (12 vols., 1854–79). For his life, consult: Hanna, *Memoirs of the Life and Writings of Thomas Chalmers* (New York, 1850); Fraser, *Thomas Chalmers* (New York, 1882); Mrs. Oliphant, *Thomas Chalmers, Philosopher and Statesman* (London, 1893); Blaikie, *Thomas Chalmers* (New York, 1897).

CHAL'ON, JOHN JAMES (1778–1854). An English landscape and genre painter. He was born in Geneva, Switzerland, but studied at the Royal Academy, London, of which he became a member in 1841. He painted with great facility in water color and oils, and his pictures include landscapes, marine views, figure and animal subjects. His best-known work is "Napoleon on Board the Bellerophon" (Greenwich Hospital). "A View of Hastings" (South Kensington Museum) and his book of humorous "Sketches of Parisian Manners" also deserve mention.—ALFRED EDWARD (1781–1860), his more celebrated brother, was also born at Geneva and studied at the Royal Academy, later becoming a member. He was the most fashionable miniature and portrait painter of his day and was appointed painter in water color to Queen Victoria, whom he portrayed, as he did also her court ladies. Later critics consider his portraits lacking pictorial qualities and characterization. One of his best oil paintings is "John Knox Reproving Queen Mary's Ladies." He was a clever imitator, especially of Watteau.

CHÂLONS-SUR-MARNE, shä'lôn' sur märn'. A garrison town of France, capital of the Department of Marne, 107 miles east of Paris by rail, on the right bank of the river Marne, which is here crossed by a handsome stone bridge (Map: France, N., K 4). Châlons-sur-Marne is an old walled town and the seat of a bishopric. The situation is agreeable, and the town contains some fine public buildings, the principal of which is the cathedral of St. Etienne, in which is one of the finest grand altars in France. Also the churches Notre Dame, St. Alpin, St. Jean,

and St. Loup are notable examples of mediæval architecture, as well as a few mansions of the fifteenth and sixteenth centuries. On the east side of the town there is the splendid *Promenade du Jard*, or park, which covers 19 acres. Châlons has a school of industry, a communal college, a seminary, a museum, and a library. It is a centre of the champagne trade, manufactures woolens, cotton, leather, etc., and has a considerable trade in grain, hemp, and rapeseed oil. Pop. (commune), 1901, 26,737; 1911, 31,367. Châlons is of great historical importance. It was known as the Roman Catalaunum, or chief town of the Catalauni, in the third century; witnessed the defeat of Tetricus by Aurelian in 274 A.D.; of the Alemanni by Jovinus in 266; and here or in the district (Catalaunian Fields), in 451, was fought one of the 15 decisive battles of the world (according to Sir Edward Creasy), when the Romans and their allies, the Visigoths, defeated Attila and his Huns. The town successfully resisted the English attacks in 1430–34; in 1589 Henry IV, King of France, held the Parlement of Paris here; it was taken by the Prussians in 1814 and by the Russians in the following year. In 1870 it was occupied by the Germans after the evacuation by MacMahon of the celebrated camp established here in 1856 by Napoleon III. See Barthélemy, *Histoire de la ville de Châlons* (1888).

CHÂLONS-SUR-SAÔNE, shȧ'lôn' sụr sôn. The capital of an arrondissement of the Department Saône-et-Loire, France, about 33 miles north of Mâcon (Map: France, N., K 6). It is situated on the right bank of the Saône, where that river is joined by the Canal du Centre, which unites the Saône with the Loire. Vineyards, woods, meadows, and cultivated fields surround it. It is irregularly built, although along the river the houses are modern, and the quays are excellent. It has two fine churches, a communal college, a library, a school of design, and an archæological museum. Its manufactures include wine, hats, hosiery, vinegar, oil, pottery, jewelry, and imitation pearls; and it has a large trade in the agricultural and other produce of the district. Le Petit-Creusot, a branch of the famous Creusot engineering works, constructs bridges, iron steamboats, and structural steel, and with its glass works, chemical works, and straw-hat manufactories, Châlons ranks as the second industrial city of Burgundy. Steamboats navigate the Saône from Châlons-sur-Saône downward. Pop. (commune), 1901, 29,058; 1911, 31,550. Châlons-sur-Saône occupies the site of the ancient Cabillonum, or Caballinum of the Ædui.

CHALOTAIS, shȧ'lô'tȧ', Louis René de Caradeuc, La. See La Chalotais, Louis René de Caradeuc.

CHALUKYAS, chȧ-lo͞o'kyȧs. The names of several dynasties of Hindu kings. The early and western Chalukyas of Bādāmi and Kalyāna ruled during the sixth and seventh centuries A.D., and another line of the same dynasty reigned over Kalyāna from 973 to 1183 A.D. The other important lines of the Chalukyas were the eastern (615–1127 A.D.) and the Chalukyas of Anhilvād (941–1296 A.D.). Consult V. A. Smith, *Early History of India* (Oxford, 1908).

CHALYBEATE (kȧ-lĭb'ē-ȧt) **WATERS** (from Lat. *chalybs*, Gk. χάλυψ, *chalyps*, from Χάλυβες, *Chalybes*, ironworkers in Asia Minor). Natural mineral waters that contain considerable amounts of iron in solution. The carbonate is generally held in solution by an excess of carbonic acid and is precipitated as soon as the latter has escaped into the air. This accounts for the characteristic deposits of ochre or ferric oxide on the surface of stones near the mouth of chalybeate-water springs. Chalybeate springs may be subdivided into *carbonated chalybeate* (or *carbonated ferruginous*) and *sulphated chalybeate*. Examples of the former are Islington Spa, Oddy's Saline Water, and Tunbridge Wells, England; and Bailey Springs, Ala., and Rawley Springs, Va., in the United States. An excess of carbonic acid communicates to the water a sparkling aspect and a pleasant acidulous taste. Of such a character are the mineral springs at Pyrmont in Germany, and they are called *carbonated chalybeate* or *carbonated ferruginous*. The sulphated chalybeate waters contain ferrous sulphate dissolved in them, and of this character are the Sand Rock Spring on the Isle of Wight, and the springs at Moffat and Vicarsbridge in England, and the Rockbridge Alum Springs, Va., and the Texas Sour Springs in the United States. Chalybeate waters have a more or less astringent or styptic taste, and show a purplish-black tint when mixed with some varieties of wine, owing to the tannin present in the latter. A pale-blue color is produced when a few drops of potassium ferrocyanide are added. Chalybeate waters are frequently prescribed in cases of debility, and as the carbonated varieties are lighter on the stomach, they are generally preferred. The chalybeate waters should be avoided in plethoric, febrile, and inflammatory conditions of the system. See Carbonated or Acidulous Waters; Mineral Waters.

CHAM, shăn (1819–79). The pseudonym of Count Amédée de Noé, a French caricaturist. He was born in Paris, the son of a peer of France. He was intended for science, but, preferring painting, he studied with Paul Delaroche and afterward with Charlet and developed a talent for the grotesque. Beginning in 1842, he contributed, chiefly to *Charivari* (the *Punch* of Paris), an immense number of caricatures, and some sketches more remarkable for their wit than for artistic merit, under the signature of "Cham." His political cartoons were singularly sharp and effective.

CHAMÆROPS, kȧ-mē'rōps (Lat., from Gk. χαμαίρωψ, *chamairōps*, from χαμαί, *chamai*, on the ground + ῥώψ, *rhōps*, bush). A genus of palms with fan-shaped leaves. It is less exclusively tropical than palms are in general, and one species, *Chamærops humilis*, is the only palm truly indigenous to Europe. It extends as far northward as the neighborhood of Nice. It is sometimes called the palmetto. The flowers are in spathes about 6 to 8 inches long; the fruit is a three-sided, blackish, spongy drupe, which is eaten, as are also the young shoots. This palm is one of the most tolerant of all palms to cold and on that account is commonly grown. In its native regions the leaves are much used for thatching and for making brooms, hats, chair bottoms, etc. They abound in an excellent fibre, which the Arabs mix with camel's hair and make into tent covers; cordage and sometimes sailcloth are made of it in Spain; it is imported into France, and used for making carpets, under the name of African hair. The French in Algeria make paper and paste-

board of it; and it is a valuable commercial commodity, as a material for paper making, cordage, upholstery, etc. Other species, sometimes referred to this genus, abundant in India, China, etc., serve similar purposes and deserve attention in connection with paper. To this genus is referred also the West Indian palm, which yields the material for chip hats. See BRAZILIAN GRASS.

CHAMALHARI, chŭm'â-lä'rê. A peak of the Himalayas (q.v.), in northwestern Bhutan (Map: India, E 3). It has an altitude of 23,929 feet.

CHAMBA, chŭm'bâ. One of the feudatory Punjab states in the Lahore division of north India, between lat. 32° 10′ and 33° 13′ N., and long. 75° 45′ and 77° 3′ E. (Map: India, C 2). The Rajah owns all the land. Area, 3126 square miles. Pop., 1891, 124,032; 1901, 127,834; 1911, 135,873.

CHAMBERED NAUTILUS, THE. A noted poem by Oliver Wendell Holmes, published in 1857, in his *Autocrat of the Breakfast-Table.*

CHAMBERLAIN, chām'bĕr-lĭn. A city and the county seat of Brule Co., S. Dak., 85 miles (direct) southeast of Pierre, on the Missouri River, and on the Chicago, Milwaukee, and St. Paul Railroad (Map: South Dakota, E 4). It is the centre of a productive stock-raising region and there are two flour mills, a cement factory, and bottling works. Chamberlain is the seat of Columbus College and has a public library and a sanitarium. In the river, opposite the city, is an island park of 1000 acres, the gift of the Federal government to the city. Chamberlain has adopted the commission form of government. Pop., 1900, 874; 1910, 1275.

CHAMBERLAIN (OF. *chambrelein, chamberlain*, Fr. *chambellan*, Sp. *camarlengo*, It. *camarlingo*, from ML. *camarlingus*, from OHG. *chamarlino, chamarling*, chamberlain, from *chamara*, Ger. *Kammer*, room, from Lat. *camera*, room, Gk. καμάρα, *kamara*, room with vaulted ceiling; connected with Lat. *camur*, crooked, Gk. κάμπτειν, *kamptein*, to bend, Ir. *cam*, crooked), LORD. In Great Britain an officer of state dating from very early times, formerly an influential member of the government and still of high standing in the royal household. He indorses the king's answer on petitions and often communicates his Majesty's pleasure to Parliament and to the Council. He has control over all the officers and servants of the royal chambers, except those of the bedchamber, as well as of all tradesmen connected with the royal household. Cards of admission to the King's drawing-room and other royal functions must be obtained from him. All theatres in towns in which a royal palace is situated require to be licensed by the Lord Chamberlain, and no new play can be performed anywhere without his license. One of the leading members of his staff is the Examiner of Plays, whose duties are to attend to these matters. In accordance with ancient custom, the Lord Chamberlain is still a member of the Privy Council, but his tenure of office depends on that of the political party to which he belongs.

CHAMBERLAIN, THE LORD GREAT. In Great Britain an hereditary officer of great antiquity and formerly of great importance. He has the government of the palace at Westminster, and during the sitting of Parliament has charge of the House of Lords and issues tickets of admission on the opening or prorogation of Parliament.

CHAMBERLAIN, ALEXANDER FRANCIS (1865–1914). A Canadian-American ethnologist and educator, born at Kenninghall, England. He graduated in 1886 at Toronto University and from 1886 to 1891 was examiner in modern languages successively at Toronto University, Trinity University, and in the educational department of Ontario Province. He was appointed lecturer (1892) and afterward assistant professor of anthropology at Clark University. Under the auspices of the British Association he made a special investigation of the Kootenay (British Columbia) Indians. He was editor of the *Journal of American Folk-Lore* in 1901–08. He was elected a fellow of the American Association for the Advancement of Science and, in addition to contributions to the *Journal of American Folk-Lore* and other periodicals, published *Report on the Kootenay Indians* (1892); *Language of the Mississaga Indians* (1892); *The Mythology of the Columbian Discovery* (1893); *Child and Childhood in Folk-Thought* (1896); *The Child: A Study in the Evolution of Man* (1900); *Poems* (1904). He contributed to the second edition of the NEW INTERNATIONAL ENCYCLOPÆDIA on South American and Asiatic tribes and peoples.

CHAMBERLAIN, RT. HON. (JOSEPH) AUSTEN (1863–). A prominent British statesman, son of Joseph Chamberlain. He was educated at Rugby and Cambridge and elected to Parliament from East Worcestershire in 1892. From 1895 to 1900 he served as Civil Lord of the Admiralty, from 1900 to 1902 as Financial Secretary to the Treasury. He was then made Postmaster-General and in 1903 Chancellor of the Exchequer. The promotion to this latter post was given partly as a recognition of ability, partly as an acknowledgment that the Conservatives, although not yet prepared to adopt in its entirety the fiscal policy of Joseph Chamberlain, still desired to propitiate the latter statesman and his more extreme followers. After the downfall of the Balfour ministry (1905) Austen Chamberlain became the leader of the more rigid tariff-reform element in his party. In 1911 he was a prominent candidate for the Unionist leadership made vacant by the resignation of Mr. Balfour; in 1913 he was made chairman of the important royal commission on Indian finance. Although somewhat eclipsed on the public stage by the more dramatic rôles played by F. E. Smith, Sir Edward Carson, Bonar Law, and other Unionists, Austen Chamberlain displayed a prodigious even if quiet activity in everything pertaining to British fiscal policy.

CHAMBERLAIN, BASIL HALL (1850–). A distinguished English Japanese scholar. He was born in Southsea, England, the grandson of Basil Hall, and was educated in France and by private tutors in England. For many years he was professor of Japanese and philology in the Imperial University of Tokio, Japan. His combination of scholarship with a light and interesting style is perhaps most evident in his *Things Japanese* (1890; 5th ed., 1905). His other works include: *The Classical Poetry of the Japanese* (1880); a version of the *Kojiki* (1883); *Language, Mythology, and Geographical Nomenclature of Japan in the Light of Aino Studies* (1887); *Aino Folk Tales* (1888); *Luchuan Grammar* (1895); *Handbook of Colloquial Japanese* (4th ed., 1907); Murray's *Japan* (1891; 9th ed., 1913, with W. B.

Mason); *Japanese Poetry* (1911); volumes in the "Japanese Fairy Tale Series"; and contributions to the *Transactions* of the Asiatic Society of Japan and of other Oriental societies.

CHAMBERLAIN, CHARLES JOSEPH (1863–). An American botanist, born at Sullivan, Ohio. He was educated at Oberlin College and at the University of Chicago, where he was assistant and associate in botany from 1897 to 1901, instructor in 1901–07, assistant professor of morphology and cytology in 1908–11, and became associate professor in 1911. Besides his contributions to the *Botanical Gazette*, he is author of *Methods in Plant Histology* (1901) and joint author with John M. Coulter (q.v.) of *The Morphology of Gymnosperms* (1901) and *The Morphology of Angiosperms* (1903).

CHAMBERLAIN, DANIEL HENRY (1835–1907). An American politician. He was born at West Brookfield, Mass., and was educated at Yale and at the Harvard Law School. In 1864 he entered the Union army and served until the close of the Civil War, chiefly as a staff officer. At the close of the war he settled in South Carolina, where he became a cotton planter and was a member of the State Constitutional Convention (1867–68), Attorney-General (1868–72), and Governor (1874–76). He was inaugurated a second time, but his election was contested by Wade Hampton, and he relinquished his office (1877) and removed to New York to practice his profession. His publications include *The Campaign in South Carolina* (1876) and *Charles Sumner and the Treaty of Washington* (1902). Consult Allen, *Governor Chamberlain's Administration in South Carolina* (1888).

CHAMBERLAIN, GEORGE EARLE (1854–). An American legislator and public official. He was born near Natchez, Miss., and graduated from the academic and law departments of Washington and Lee University in 1876. Taking up the practice of law in Oregon, he early became prominent politically. He was in succession a member of the State Legislature, district attorney for the third judicial district, Attorney-General of the State, and, having removed to Portland, district attorney for the fourth judicial district. In 1902 he was elected Democratic Governor of Oregon and in 1906 was reëlected. Three years later he was chosen United States Senator for the term ending 1915. In the first session of the Sixty-third Congress he was chairman of the Public Lands Committee, and he was also a member of numerous important committees.

CHAMBERLAIN, HENRY RICHARDSON (1859–1911). An American journalist, born at Peoria, Ill. He took up journalistic work in 1877, was in succession correspondent of the New York *Sun*, managing editor of the New York *Press*, and managing editor of the Boston *Journal*. In 1893 he was made correspondent of the *Sun* in London, with general oversight of the Laffan News Bureau in Europe. He reported the Macedonian disturbances, the details of the Panama Canal scandal, the Russian political crisis of 1906, and the Messina earthquake. He became known for his extensive knowledge of European politics. His publications include *The Farmers' Alliance* (1891) and *Six Thousand Tons of Gold* (1894).

CHAMBERLAIN, HOUSTON STEWART (1855–). A versatile German writer. He was born Sept. 9, 1855, at Portsmouth, England, the son of an admiral in the British navy. His earliest education he received at Versailles, and later attended Cheltenham College, Gloucester. At first he planned to follow a military career, but poor health compelled him to abandon this intention. In 1870 he left England and settled in Germany, at first in Stettin. Here Professor Kuntze aroused his interest in Germanic culture and civilization, the study of which occupied him for many years and resulted in his most original and very remarkable work, *Die Grundlagen des 19 Jahrhunderts*, published in two parts in 1899 and 1901 (reprinted subsequently in several editions, and translated into English by Lord Redesdale in 1910). In 1878 he married a daughter of Richard Wagner. In 1879–81 he studied natural sciences in Geneva, and at the same time music under A. Ruthard. In 1885 he took up his residence in Dresden and began his activity as a contributor to several prominent German, English, and French periodicals, writing with equal facility in all three languages. In 1889 he settled permanently in Vienna. His chief work on music is his comprehensive and excellent biography of Richard Wagner, which he published in German (1896), English (1897), and French (1899). Other works concerning Wagner are: *Das Drama Richard Wagners* (1892); *R. Wagners echte Briefe an F. Prager* (1894); *Die ersten 20 Jahre der Bayreuther Festspiele* (1896); *Parsifalmarchen* (1900). His other works are: *Worte Christi* (1901); *Heinrich von Stein* (1903); *Immanuel Kant* (1905); *Goethe* (1912).

CHAMBERLAIN, JACOB (1835–1908). An American missionary of the Reformed Dutch church, born at Sharon, Conn. He graduated at the Western Reserve College, 1856, and New Brunswick Theological Seminary, 1859, and received the degree of M.D. (College of Physicians and Surgeons, New York City), 1859. In December of 1859 he went as missionary to the Arcot Mission, southern India. He is recognized as one of the leading missionaries of India. His linguistic attainments were remarkable and he played a prominent part in translating the Scriptures into Telugu. In English he published: *At Home, or Christian Giving* (1879); *Break Cocoanuts over the Wheels; or, All Pull for Christ* (1885); *Native Churches and Foreign Missionary Societies* (1879); *Winding Up; In the Tiger Jungle* (1896); *The Cobra's Den and Other Stories of Missionary Work among the Telugus of India* (1900); and other books on mission subjects.

CHAMBERLAIN, RT. HON. JOSEPH (1836–1914). A distinguished British statesman, born in London, July 8, 1836. He was educated at the University College School, entered the screw-manufacturing firm of Nettlefold and Chamberlain, Birmingham, of which his father was a partner, and retired in 1874 with a large fortune. He early distinguished himself in local debating societies by his radical opinions and ready, forceful eloquence. He became very popular in the northern industrial centres, and was three times elected mayor of Birmingham, 1873–76. His mayoralty was marked by extensive municipal improvements looking largely to the amelioration of the condition of the poorer classes and carried out against much opposition. After an unsuccessful contest at Sheffield in 1874 he entered Parliament in 1876 on a Birmingham by-election. He was returned at the general election of 1880 and became President of the Board of Trade under Gladstone with

membership in the cabinet. He achieved wide fame as the advocate of popular reforms, including measures aiming at the restitution of the land to small proprietors, free education, a system of graduated taxation and increased powers of local self-government. In 1885 he was returned to Parliament for Birmingham, West, became President of the Local Government Board under Gladstone in January of the following year, but resigned in March because of his antagonism to Gladstone's Home Rule Bill, and with Lord Hartington organized the Liberal Unionist party which helped to bring about the defeat of the measure and the fall of the Gladstone ministry. In 1888 he was one of the British commissioners sent to Washington to effect a settlement of the Canadian fisheries dispute. In November he married, as his third wife, Miss Endicott, daughter of President Cleveland's Secretary of War. When Lord Hartington became Duke of Devonshire (1891), Mr. Chamberlain succeeded him as leader of the Liberal Unionist party in the House of Commons. In the Salisbury cabinet of 1895, which marked the definite amalgamation of the Conservative and the Liberal Unionist party, he became Secretary for the Colonies. The former Republican and Radical now entered upon a policy of aggressive imperialism. The great event of his administration was the war with the Boer republics, which was hastened, if not caused, by the Jameson Raid and the intrigues of Cecil Rhodes's South African Company, in which Mr. Chamberlain was charged with being implicated. A committee of the House of Commons in 1897 acquitted him of all complicity in the raid, but his name nevertheless remained the one particularly associated with the policy which ended in the extinction of the South African republics. In the general election of 1900, the so-called "Khaki" election, which was brought about largely by Mr. Chamberlain in order to take advantage of the patriotic fervor animating the nation, he was the principal mark for the Liberal attack, but came out triumphant. A noteworthy achievement of the same year was the passage of the act constituting the Australian Commonwealth. The retirement of Lord Salisbury in 1902 and the succession of Mr. Balfour as Premier brought no change in the Colonial Office. In the winter of 1902–03 Mr. Chamberlain visited South Africa, where his speeches left no doubt of his intention to continue a firm imperialistic policy.

In May, 1903, Mr. Chamberlain injected a new and momentous question into the field of political discussion by bringing forward proposals for a system of preferential tariffs with the colonies as the only means for promoting a closer union of the Empire. The question of establishing more intimate relations between the United Kingdom and the colonies had occupied him as early as 1897, when he presided over a conference of colonial premiers assembled in London on the occasion of Queen Victoria's jubilee. A second conference met in 1902. Mr. Chamberlain's proposals, by openly advocating the imposition of a tax on foreign food products in violation of the traditional free-trade policy which had remained unchallenged for 60 years, produced a profound impression, and led ultimately to an unprecedented change in the balance of parties. (For the fiscal controversy, see GREAT BRITAIN.) In September, 1903, he resigned from the cabinet in order to have a free hand in expounding his views to the country, which, he admitted, was not as yet prepared to accept them. In 1904 he succeeded in reorganizing the Liberal Unionist party machinery on a basis which made it a tariff-reform party. His outspoken views, in contrast to the halfway position assumed by Mr. Balfour, made him in 1904 and 1905 the strongest man on the ministerial side. Mr. Balfour saw himself gradually impelled towards a common position with Mr. Chamberlain, and the latter's insistence on an aggressive tariff-reform policy contributed to the resignation of the Balfour cabinet in December, 1905. The general election, fought out principally on the fiscal question and resulting in the overwhelming defeat of the Unionist party, was accepted by most as an unmistakable repudiation of tariff reform. But Mr. Chamberlain chose to interpret his personal triumph in Birmingham, which he carried solidly for the Unionists, as a vindication of his judgment in insisting on a forward policy. Although illness after 1906 largely restricted his activities, he continued to hold his seat in Parliament and to inspire the progress of the tariff-reform movement for several years, not finally retiring from that body till the early part of 1914. Consult: Morris, *The Right Hon. Joseph Chamberlain* (New York, 1901); Jeyes, *Mr. Chamberlain: His Life and Public Career* (London, 1903); Creswicke, *Life of Joseph Chamberlain* (3 vols., London, 1904), Mackintosh, *Joseph Chamberlain* (London, 1906).

CHAMBERLAIN, JOSHUA LAWRENCE (1828–1914). An American soldier and educator. He was born in Brewer, Me., graduated at Bowdoin College in 1852 and at the Bangor Theological Seminary in 1855, and was professor of modern languages at Bowdoin when the Civil War broke out. He then enlisted in the Union army and served with distinction throughout the war, was several times wounded, and left the service (1865) with the brevet rank of major general. From 1866 to 1871 he was Governor of Maine, and in 1871–83 was president of Bowdoin College. When the Democrats and Fusionists under Governor Garcelon got possession of the State Legislature in 1879–80, and the Republicans organized a rival body, peace was preserved by the militia of the State under the command of General Chamberlain until the legality of the Republican Legislature was established by decision of the Supreme Court. (See MAINE, *History.*) He resigned the presidency of Bowdoin in 1883, and removed to New York to practice law. He published *Maine: Her Place in History* (1877); *American Ideals* (1890); *Ethics and Politics of the Spanish War* (1898); *Property: Its Office and Sanction* (1900); *De Monts and Acadia* (1904); *Ruling Powers in History* (1905), and edited an extensive work entitled *Universities and their Sons* (1898).

CHAMBERLAIN, MELLEN (1821–1900). An American librarian and historical writer. He was born in Pembroke, N. H., graduated at Dartmouth in 1844 and at the Harvard Law School in 1848, and in 1849 began the practice of the law in Chelsea, Mass. He subsequently served for some years in the Massachusetts Legislature; was chairman of the Judiciary Committee in the Senate; became a justice of the Boston Municipal Court in 1866; and from 1870 to 1878 was Chief Justice. From 1878 to 1890 he was librarian in chief of the Boston Public Library. He devoted much of his time to the

study of American history and wrote a number of monographs and essays of considerable value, some of which were collected into a volume entitled *John Adams, the Statesman of the Revolution, and Other Essays* (1898). Among his other publications are: *The Journals of Captain Henry Dearborn, 1775–83* (1886–87); several chapters, notably the one entitled "The Revolution Impending," in Winsor's *Narrative and Critical History of America* (1884–89); *The Authentication of the Declaration of Independence* (1885); *The Constitutional Relations of the American Colonies to the English Government at the Commencement of the American Revolution* (1887).

CHAMBERLAIN, MONTAGUE (1844–). A Canadian ornithologist, born at St. John, New Brunswick. In 1890 he became recorder of Harvard University, and from 1893 to 1900 was secretary of the Lawrence Scientific School. He was one of the founders of the American Ornithological Union. Besides a revision of *Nuttall's Handbook of the Birds of Eastern North America* (1872), he published the following important works and lectures: *Canadian Birds* (1870); *Nuttall's Ornithology, Revised and Extended* (1891, 1896); *Birds of Greenland* (1892); *Some Canadian Birds* (1895); *The Church Army* (1897); *The Penobscot Indians* (1899).

CHAMBERLAIN, SIR NEVILLE BOWLES (1820–1902). An English soldier, born in Brazil. He entered the Indian army in 1837 and served throughout the Afghan War of 1839–42, during which he was six times wounded. In 1842 he was attached to the Governor-General's bodyguard, with which he in 1843 participated in the battle of Maharajpur. He was promoted to be lieutenant colonel, commanded the Punjab frontier force from 1854 to 1857, in the latter year became adjutant general of the Indian army, and during the Mutiny (1857–58) distinguished himself, being present at the taking of Delhi. He was commissioned lieutenant general in 1872, full general in 1877, and field marshal in 1900. In 1876–81 he was commander in chief of the Madras army, in 1878 was a member of a special mission to the Ameer of Afghanistan, and for some time was military member of the Council of the Viceroy of India. It was said of him before his retirement from active service that he had been more often wounded than any other officer of the British army.

CHAMBERLIN, AGNES. A Canadian illustrator and author, the daughter of Susannah Moodie, a Canadian author (one of the Strickland sisters). She was born and educated in Belleville, Ontario. She wrote and illustrated *Canadian Wild Flowers*, the first Canadian publication of its kind, the three editions of which necessitated the coloring of 15,000 plates. She also illustrated Mrs. Traill's *Studies of Plant Life*. In 1876 her drawings were exhibited at the Philadelphia Centennial Exhibition. The set of Canadian fungi published by the Geological Survey of Canada was made from her drawings.

CHAMBERLIN, THOMAS CHROWDER (1843–). An American geologist, born at Mattoon, Ill. He graduated in 1866 at Beloit College, studied science at Michigan University, and from 1869 to 1873 was professor of natural science at the State Normal School, Whitewater, Wis. From 1873 to 1882 he was professor of geology at Beloit College, and from 1887 to 1892 was president of the University of Wisconsin. In 1892 he took charge of the geological department of the University of Chicago, and later became editor of the *Journal of Geology*. In 1873–76 he was assistant State geologist for Wisconsin, in 1876–82 was chief geologist, and in 1882 was a United States geologist in charge of the glacial division. While engaged in this active geological work he collected and published a large amount of new material relative to the character of the glacial deposits in the Northern States, upon which he based some interesting theories. He has also made a study of modern glaciers, with valuable scientific results. He was geologist of the Peary Arctic relief expedition in 1894. The planetesimal hypothesis, which he formulated in company with Moulton as an explanation of the origin of the planetary system, has commanded general attention in the scientific world. He was president of the Geological Society of America in 1894 and of the American Association for the Advancement of Science in 1908. His publications include: *Outline of a Course of Oral Instruction* (1872); *Geology of Wisconsin* (1877–83); *Contribution to the Theory of Glacial Motion* (1904); with R. D. Salisbury, *Geology* (3 vols., 1907–09), and many geological papers.

CHAMBER MUSIC. A term used to designate music that is specially adapted for performance in a small auditorium. The name originally designated both vocal and instrumental music, not intended for the church or theatre; but it is now entirely restricted to works written for the combination of instruments employed in trios, quartets, etc., up to nonets or decimets, where each instrument is represented by only one performer. Compositions for piano with some other instrument (violin, 'cello, clarinet), and even for one or more solo voices with piano and some other instrument, are included. There is a distinct chamber-music style, just as we distinguish orchestral style, piano style, vocal style, etc. Chamber music demands nothing less than absolute mastery of all technical details from both composer and performer. During the seventeenth and early part of the eighteenth century the history of chamber music is intimately connected with that of the violin. Consult: J. Wasielewski, *Die Violine und ihre Meister* (Stuttgart, 1904); N. Kilburn, *The Story of Chamber Music* (London, 1904); E. Krause, *Die Entwicklung der Kammermusik* (Hamburg, 1904); A. Schering, *Geschichte des Instrumentalkonzerts* (Leipzig, 1905).

CHAMBER OF COMMERCE. A body of merchants and traders, associated for the purpose of promoting the interests of its own members, of the town or district to which the society belongs, and of the community generally, in so far as these have reference to trade and merchandise. In America and England the chambers of commerce are voluntary associations with no recognized official functions. They exert an influence upon the course of legislation through the adoption of resolutions, through the investigation of conditions affecting trade and publication of findings. Not infrequently the views of important chambers of commerce are sought by legislators engaged in the drafting of regulations affecting industry.

In the countries of continental Europe the chamber of commerce is endowed with official character, and is often vested with administrative functions concerning trade. In some coun-

tries it is made their duty to express their opinion in advance upon proposed legislation, and in the Hanse cities they must by law be consulted before certain kinds of legislation can be considered.

Chambers of commerce originated on the continent of Europe, when, with the gradual disintegration of the old guild system, they were clothed with some of the municipal and administrative functions which had in earlier times been exercised by the craft guilds. The first of these organizations on record is that of Marseilles, which grew out of a commission of merchants established in 1599, and enlarged in 1650 and given practically the form of a chamber of commerce. Similar bodies were created at Dunkirk in 1700, and in the following year at Rouen, Toulouse, Lyons, Bordeaux, and other points. During the Napoleonic period, when the French influence extended to Holland, Germany, Austria, and Italy, similar organizations were established in the principal cities of those countries. Before this time they had spread to Scotland, where the year 1773 witnessed the establishment of the Glasgow Chamber of Commerce, and to the American Colonies, where the New York Chamber of Commerce was organized in 1768. It was not until the early part of the nineteenth century that the institution took root in England. The Chamber of Commerce of Manchester was organized in 1820, but that of London not until 1882. At the present time such organizations, whether under the original name of chamber of commerce or under that of board of trade, are well-nigh universal, and no town of any considerable importance lacks such a corporate representation of its mercantile interests.

CHAMBERS (OF. *chambre, cambre*, It. *camara*, Ger. *Kammer*, OHG. *chamara*, chamber, from Lat. *camera*, room, Gk. καμάρα, *kamara*, room with vaulted ceiling; connected with Lat. *camur*, crooked, Gk. κάμπτειν, *kamptein*, to bend, Ir. *cam*, crooked). In English and American law, the private room or office of a judge in which he hears motions, signs papers, or does other business pertaining to his office. A judge is said to act at "chambers" when any legal proceeding is carried on before him out of court, either at his office or residence, or other convenient place, including the court room itself, provided he is acting in his individual capacity as judge and not formally as the presiding officer of the court. The practice of making orders and transacting other judicial business in chambers is of considerable antiquity and appears to have grown up insensibly to avoid the serious inconveniences of short and infrequent terms of the courts. The validity of orders made out of court was long disputed, but was conclusively established early in the last century. The practice received its first statutory sanction by Act of Parliament in 1821.

In general, *ex parte* proceedings and proceedings incidental to an action or to the main proceeding may be carried on at chambers. Modern statutes have increased materially the business which may be transacted in this manner; and the codes of civil procedure adopted in several of the United States expressly provide that certain acts may be done by the *court*, and others by a *judge* of the court.

Under the English statutes, 16 Vict., c. 80, and 36 and 37 Vict., c. 66, the office of master in chancery (q.v.) was abolished, and the business formerly transacted by him was directed to be transacted under the direction of a judge at chambers by officers of the court. Consult the authorities referred to under PRACTICE; also Coe, *Practice at the Judges' Chambers, Queen's Bench*, etc. (London, 1876). See MASTER IN CHANCERY.

CHAMBERS, CHARLES EDWARD STUART. See CHAMBERS, WILLIAM.

CHAMBERS, chām'bẽrz, CHARLES HADDON (1860–). An English playwright. He was born April 22, 1860, and educated at Sydney, N. S. W., where he entered the civil service in 1875. Two years afterward he turned for a time to a life of more adventurous experiences in the "bush." His first visit to England was in 1880, and in 1882 he went to London to engage in literary work. His first work was in the way of articles and stories for the periodicals, but about 1886 he began dramatic writing. After several minor achievements he made his first great success with *Captain Swift*, which was produced at the Haymarket Theatre, June 20, 1888. Subsequently he wrote *The Idler*, first produced in New York at the Lyceum Theatre, and a few weeks later at the St. James, London (1891); *The Honorable Herbert* (Vaudeville, 1892); *John a' Dreams* (Haymarket, 1894); *The Tyranny of Tears* (1899); *The Awakening* (1901); *The Golden Silence* (1903); *Sir Anthony* (1906); *Passers-By* (1911); *Tante* (1913). Both *The Tyranny of Tears*, with John Drew, and *Tante*, with Ethel Barrymore, were presented in New York in 1913.

CHAMBERS, EDMUND KERCHEVER (1866–). An English scholar and educator. He was born in Berkshire, and was educated at Marlborough and at Corpus Christi College, Oxford, where he was Chancellor's English essayist in 1891. In the next year he entered the Education Department and became Assistant Secretary of the Board of Education. He was created C.B. in 1912. His most important work was on early English poetry, especially the drama. He wrote *The Mediæval Stage* (1903) and *The Tudor Revels* (1906), and the article on "Shakespeare" for the 11th edition of the *Encyclopædia Britannica;* and edited *English Pastorals* (1895), Donne's *Poems* (1896), Vaughan's *Poems* (1896), *The Red-Letter Shakespeare* (1904–08), and *Early English Lyrics* (1907), with F. Sidgwick.

CHAMBERS, EDWARD THOMAS DAVIES (1852–). A Canadian journalist and author. He was born at Saffron Walden, England, and was educated there and in Canada, to which he went in 1870. After two years of school teaching he entered journalism and established *Progress*, the first newspaper printed in Argenteuil Co., Quebec. He became a member of the staff of the *Daily Chronicle* (Quebec City) and in 1897 editor of this paper; later editor of the *Mercury* and of *North American Notes and Queries*. He contributed frequently to British, American, and Canadian magazines on subjects relating to Canadian scenery, resources, and, especially, hunting and fishing. In 1884–94 he was an alderman of Quebec and for a time was promayor. He was prominent in organizing the Champlain celebration in 1906 and the Quebec tercentenary celebration in 1908. His publications include: *The Port of Quebec: Its Facilities and Prospects* (1890); *The Haunts of the Ouananiche* (1891); *Quebec, Lake St. John and the Saguenay* (1895); *The Ouananiche and*

Its Canadian Environment (1895); *The Anglers' Guide to Eastern Canada* (1898); *The Sportsman's Companion* (1899); *The Quebec Tercentenary Commemorative History* (1909).

CHAMBERS, EPHRAIM (c.1680–1740). An English encyclopædist. In early life he was an apprentice to a map and globe maker in London, where he formed the plan of compiling an encyclopædia on a larger scale than that of John Harris's *Lexicon Technicum* (1704), then the only work of the kind in the language. He published by subscription the first edition of his *Cyclopædia, or an Universal Dictionary of Arts and Sciences*, in 1728. Ten years later the second edition appeared, and in the year following the third. The fourth was issued in 1741, a year after the editor's death, and many other editions have since been issued. A French translation of it gave rise to Diderot's and D'Alembert's *Encyclopédie*. It was also expanded into Dr. Rees's once well-known *Encyclopædia*. Chambers was an avowed freethinker, irascible, kind to the poor, and extremely frugal.

CHAMBERS, ERNEST JOHN (1862–). A Canadian journalist and author. He was born at Penkridge, Staffordshire, England, but early went to Canada and was educated at the Montreal high school. He entered journalism in Montreal in 1880, and in 1885 during the second Northwest Rebellion under Louis Riél (q.v.) was correspondent for the Montreal *Star*. In 1893–96 he was joint proprietor and editor of the *Canada Military Gazette*, and in 1894 he established the *Metropolitan*, a weekly journal. In 1904 he removed to Ottawa, having received the government appointment of Gentleman Usher of the Black Rod. In 1908 he became the editor and publisher of *The Parliamentary Guide*. He published: *The Book of Montreal* (1903); *The Book of Canada* (1905); *The Canadian Marine* (1906); *The History of the Royal Northwest Mounted Police* (1906); *Canada's Fertile Northland* (1908). He also wrote many regimental histories of the Canadian militia.

CHAMBERS, GEORGE FREDERICK (1841–1915). An English author. He was educated at Brighton, and at King's College, London, and held several local government posts, becoming a member of the Lewisham Borough Council in 1904. Among his many books on very diverse subjects are: *Handbook of Descriptive and Practical Astronomy* (3 vols., 4th ed., 1889–90), *Pictorial Astronomy* (1891), *The Story of the Sun, Stars, Eclipses, Weather, Comets* (4 vols., 1895–99), and *Astronomy for Amateurs* (1912); digests of laws of public health, etc., and textbooks of law; and guidebooks of Sussex (1877) and Eastbourne, including *Old Memories of Eastbourne* (1910).

CHAMBERS, ROBERT (1802–71). A Scottish publisher and author, born at Peebles, July 10, 1802. He attended the local grammar school, where he learned Latin; and at home read through the fourth edition of the *Encyclopædia Britannica*. The family moved to Edinburgh in 1813, where, five years later, Robert set up as a bookseller, read extensively, and began writing. His *Traditions of Edinburgh* (1823) procured him the friendship of Sir Walter Scott, who contributed various memoranda for the work. It was followed by a large number of books, among which are *Popular Rhymes of Scotland* (1826), *Picture of Scotland* (1826), and *History of the Rebellions in Scotland* (1828–29). He also edited *Scottish Ballads and Songs* (1829), the *Biographical Dictionary of Eminent Scotsmen* (4 vols., 1832–34), and many other collections. The success of *Chambers's Edinburgh Journal*, founded in 1832 by his brother, William Chambers, was materially promoted by his many essays, moral and humorous. His great work, however, is the *Vestiges of the Natural History of Creation*, published anonymously in 1844. It is a brilliant exposition of development in the natural world, and it prepared the public for the theories of Darwin. Among his later works are: *Ancient Sea Margins* (1848), *Life and Works of Robert Burns* (1851), *Domestic Annals of Scotland* (1859–61), and *The Book of Days*, a miscellany (1863). Ever since 1832 he had been a member of the firm of William and Robert Chambers, printers and publishers. He died March 17, 1871. A collection of his miscellaneous papers appeared in 7 vols. (1847).

CHAMBERS, ROBERT. See CHAMBERS, WILLIAM.

CHAMBERS, ROBERT WILLIAM (1865–). An American novelist and writer of short stories, who has scored many a popular success. He began his career as an artist after studying at the Julian Academy, Paris, and became an illustrator for various New York weeklies; but he soon practically abandoned the brush for the pen. The long list of his writings includes: *In the Quarter* (1893); *The Red Republic* (1894), *Lorraine* (1896); *The Cambric Mask* (1899); *The Conspirators* (1900); *The Fighting Chance* (1906); *The Firing Line* (1908); *The Green Mouse* (1910); *Adventures of a Modest Man* (1911); *Streets of Ascalon* (1912); *Gay Rebellion* (1913); *The Business of Life* (1913). Among his early productions was a drama, entitled *The Witch of Ellengowan*, and written for Ada Rehan, which was performed at Daly's Theatre.

CHAMBERS, TALBOT WILSON (1819–96). An American clergyman. He was born at Carlisle, Pa., graduated in 1834 at Rutgers College, studied in 1836–37 at Princeton Theological Seminary, and in 1838 was licensed to preach. From 1839 to 1849 he was pastor of the Second Reformed Dutch Church, Somerville, N. J., and from 1849 to 1871 one of the pastors of the Collegiate Dutch Church of New York City. He was a member of the Old Testament Company of the American Bible Revision Committee. He published: *The Noon Prayer-Meeting in Fulton Street* (1857); *Memoir of Theodore Frelinghuysen* (1863); expositions of Amos and Zechariah (in the Schaff-Lange *Commentary*, 1874); *The Psalter: A Witness to the Divine Origin of the Bible* (1875); a *Companion to the Revised Version of the Old Testament* (1885).

CHAMBERS, W(ASHINGTON) IRVING (1856–). An American naval officer, born in Kingston, N. Y. He graduated from the United States Naval Academy in 1876, served on various vessels, and in 1883 was appointed to service in the office of naval intelligence. During 1884 he was a member of the Greely relief expedition and was engaged in the special survey of the Nicaragua Canal Route. Thereafter in succession he served in the office of naval intelligence, at the Naval War College, as inspector of ordnance at sea, and at the naval torpedo station. In 1907–09 he was chief of the Bureau of Ordnance and in 1909–11 assistant to the aid for material. After that he was in charge of the development of aviation in the Bureau of Navigation.

CHAMBERS, WILLIAM (1800–83). A Scottish publisher and author, elder brother of Robert Chambers. He was born at Peebles and when 19 years old began business as a bookseller in Edinburgh. Between 1825 and 1830 he wrote the *Book of Scotland* and, jointly with his brother, the *Gazetteer of Scotland.* His venture, *Chambers's Edinburgh Journal,* was a success from the first. The two brothers established in 1832 the firm of W. & R. Chambers, thereafter writing, editing, and printing various popular and notable works, including their 10-volume *Cyclopædia* (1859–68). William Chambers wrote independently, among other books, *Things as they Are in America* (the result of a visit to the United States in 1853). He was Lord Provost of Edinburgh in 1865–69, and in 1872 the University of Edinburgh conferred upon him the degree of LL.D., in recognition, especially, of his services in improving the older part of the city. He died May 20, 1883, and ROBERT CHAMBERS (1832–88), eldest son of the Robert Chambers named above, became editor of the *Journal* and head of the firm. On his death, in 1888, he was in turn succeeded by his son, CHARLES EDWARD STUART CHAMBERS (1859-), who is also a well-known editor. Consult Chambers, *Memoir of W. and R. Chambers* (Edinburgh, 1872, 13th ed., with additions, 1884).

CHAMBERS, SIR WILLIAM (1726–96). An English architect. He was born in Stockholm, but was brought to England in his infancy. In his youth, as a supercargo in the service of the Swedish East India Company, he made a voyage to China, and there produced sketches, which were published under the title *Designs for Chinese Buildings.* At the age of 18 he left the sea and studied architecture in Italy and Paris. He returned to England in 1755 and became the foremost living English architect, continuing the propaganda for the Palladian style begun by Inigo Jones. His masterpiece is the remodeling of Somerset House in 1776. He also designed buildings for Kew Gardens, the pagoda among them. He wrote several books, including a *Dissertation on Oriental Gardening,* in which he praised extravagantly the Chinese artificial system of laying out grounds. The book called forth several keen satires, of which the most widely circulated was *An Heroic Epistle to Sir William Chambers,* probably written by William Mason. It is said that Horace Walpole had a hand in it also. Chambers's high reputation as a writer rests upon his standard work for classic architecture, *A Treatise on the Decorative Part of Civil Architecture,* which exercised a potent influence on the architecture of his time. He was created Knight of the Polar Star by the King of Sweden (1771), and George III permitted him to use his title in England.

CHAMBERSBURG. A borough and the county seat of Franklin Co., Pa., 52 miles by rail southwest of Harrisburg, on the Cumberland Valley and the Western Maryland railroads, and on Conococheague Creek (Map: Pennsylvania, F 8). It is finely situated in the broad Cumberland valley and in a populous and well-cultivated region. Chambersburg is the seat of Wilson College (Presbyterian) for women, organized 1870; Penn Hall Preparatory School for girls; and it has a small courthouse, hospital, children's home, old people's home, public library, memorial fountain, and many handsome churches, while in the vicinity are Wolf Lake, Mont Alto, and several parks. There are manufactures of hosiery, flour, furniture, wool, dresses, paper, iron, milling machinery, engines, boilers, soap, steam and hydraulic machinery, iron castings, silk, ice, and condensed milk; and the shops of the Cumberland Valley Railroad are situated here. The city owns and operates its water works and electric light plant. Its government has its source in special acts of the State Legislature, which provide for a chief burgess, elected every three years, and a borough council. Pop., 1890, 7863, 1900, 8864; 1910, 11,800.

Chambersburg was first settled (in 1730) by Benjamin Chambers, an immigrant from Ireland, and was for many years called "Falling Spring." It was incorporated in 1803. On July 30, 1864, the Confederate General McCausland burned the town in default of the payment of a ransom of $100,000. It was entirely rebuilt after the war. Consult *History of Franklin County* (Chicago, 1887).

CHAMBERTIN, shän'bĕr'tăn'. A red wine of Burgundy, which is famous for having been a favorite with both Louis XIV and Napoleon. The grape is grown on the hills near Dijon, and the vineyard (Chambertin) is divided among several proprietors. See WINE.

CHAMBERY, shäm'bâ'rē'. The capital of the Department of Savoie, France, situated in an elevated valley about 6 miles south of Lake Bourget, at an elevation of over 800 feet (Map: France, S., K 3). It is not a modern city, and most of its streets are flanked by old and gloomy buildings. It contains a cathedral dating from the fifteenth century and a number of interesting old churches. The castle of the dukes of Savoie, which was repeatedly demolished by fire, has been restored, and is now used by the administrative authorities of the department. There are also a museum, a fine library of 40,000 volumes, a number of institutions for higher and secondary education, and a theatre. The chief industries are the manufacture of lace, silk fabrics, leather, soap, paper. Pop. (commune), 1901, 22,108; 1911, 22,958.

CHAMBE'ZI. A river of Africa, one of the head streams of the Congo (Map, Congo Free State, F 5). It rises in the plateau between the lakes of Tanganyika and Nyassa and, flowing southwest, enters Lake Bangweolo in the wet season, but during the dry season skirts the southern border of the shrunken lake and flows directly into the Luapula River.

CHAMBIGES, shän'bēzh', MARTIN (?–1532). A French architect of the late Gothic period. He built parts of three of the finest cathedrals in France—Sens (transept, 1494, portals, 1501–13), Troyes (façade, 1502), and Beauvais (transept, 1500–32)—and was one of the few really great architects of his age. His son, PIERRE CHAMBIGES, besides assisting his father, took part in the building of the Hôtel de Ville in Paris (1533–34), with Domenico da Cortona (Bogador), and of the Château de Fontainebleau (1538), but his claim to originality rests on the remarkable Château de Saint-Germain, near Paris, which stands between the Gothic and Classic styles, and between Feudal and Renaissance castles, in a style peculiar to itself.

CHAM'BLISS, CHARLES EDWARD (1871–). An American entomologist, born at Petersburg, Va. He was educated at the University of Tennessee, where from 1894 to 1900 he was an instructor in zoölogy and entomology, acting at the same time as entomologist of the Ten-

nessee Agricultural Experiment Station. Subsequently he was State entomologist of Tennessee, associate professor of zoölogy and entomology at Clemson College, and State entomologist of South Carolina. In 1908 he took charge of the rice investigations of the United States Department of Agriculture. He published *A Preliminary Report on Rice-Growing in the Sacramento Valley* (1912), a bulletin of the United States Department of Agriculture.

CHAMBLY (shän'blē') **RIVER.** See RICHELIEU.

CHAMBORD, shän'bôr'. A celebrated castle of the Renaissance in France. It is situated in the Department of Loir-et-Cher, about 12 miles east of Blois, in the midst of a park 21 miles in circumference. It was begun by Francis I in 1526, and was continued by his successors of the houses of Valois and Bourbon. The building marks the transition between the fortified castle and the Italian palace, and is surmounted by a vast number of turrets, minarets, and cones. The most prominent features of the structure are its six round towers, each 60 feet in diameter. The double spiral staircase in the central tower is so contrived that persons ascending and descending may pass each other without meeting. The castle, which contains 440 chambers, was the residence of Francis I, Henri II, and Louis XIV, and the scene of the first presentation of Molière's *Bourgeois gentilhomme.* Among the other occupants of Chambord were Marshal Saxe, Stanislas Leszczynski, King of Poland, and Marshal Berthier, upon whom it was bestowed by Napoleon. In 1821 it was bought from Berthier's widow by a number of Legitimists and presented to the infant Duc de Bordeaux, who was afterward known as the Comte de Chambord. The possession of this celebrated château was passed on by bequest to the Parma family in 1883. Consult Millot, *Les châteaux historiques: Chambord* (Paris, 1875).

CHAMBORD, HENRI CHARLES FERDINAND MARIE DIEUDONNÉ D'ARTOIS, DUC DE BORDEAUX, COMTE DE (1820–83). A Bourbon claimant to the French throne. He was the son of the Duc de Berry, who was murdered by Louvel on Feb. 13, 1820, and the grandson of Charles X. Seven months after the death of the Duc de Berry, who was heir presumptive to the throne of France, his widow gave birth to a prince, who received the title of Duc de Bordeaux—that of count, by which he was subsequently known, being derived from the castle of Chambord (q.v.), presented to him at his christening. He was baptized amid circumstances of great pomp, with water brought by Chateaubriand from the river Jordan, and received the appellation of *l'enfant du miracle.* Chambord was chosen by Charles X to succeed him when, in 1830, he abdicated the French throne; and at the death of Charles the Legitimists proclaimed Chambord King. In 1839 the Prince visited Italy, accompanied by his mother, and was received by the petty courts with great distinction. After the death of the Duc d'Angoulême, in 1844, the heads of the different factions of Legitimists met in London to pay their united homage, and the Duc de Bordeaux made a "pilgrimage to Belgrave Square" to receive it. In 1846 he married a sister of the Duc de Modena, who had never acknowledged the monarchy of July. After the revolution of 1848 many Legitimists were returned to the National Assembly, and in 1850 the Comte de Chambord appeared at Wiesbaden, where a congress of his adherents assembled to consult as to their future policy. As the Comte de Chambord was without heirs, a union of the partisans of the elder Bourbons with the Orleanists was effected, but no attempts were made to carry out the arrangement. After the fall of Napoleon III, in 1870, repeated attempts were again made to effect a coalition between the supporters of the Bourbons and the Orleanist claims; but whatever chance there might have been for a royal restoration during the troubled days of the Third Republic before 1880 was ruined by the Comte de Chambord's obstinate refusal to abandon his extreme Legitimist views, which he aired more than once in "royal" proclamations. He died at Frohsdorf, in Lower Austria, which had been his residence for many years, Aug. 24, 1883.

CHAMBRE ARDENTE, shän'brür'dänt' (fiery room). A tribunal established by Francis I in 1535 for the trial and execution of heretics apprehended by the Inquisition. It derived its name from the manner of execution, which was chiefly by burning. It flourished during the civil wars and the time of the League, but sank into abeyance under the early Bourbons. Louis XIV, however, employed it in the investigation of the numerous reports of poisonings that followed the apprehension of the Marquise de Brinvilliers (q.v.). It was discovered that a certain hag named La Voisin, posing as a sorceress, had been driving a lively trade in poisons—"succession powders," they were called—with such as were afflicted with superfluous husbands, fathers, or rival heirs. Many persons of the highest court circles, the Marshal Luxembourg among them, were summoned before the tribunal, but the affair ended with the execution of the sorceress only, in 1680. With this the Chambre Ardente ceased its activity. Consult Weiss, *La chambre ardente* (Paris, 1889), and Ravaisson, *Archives de la Bastille* (Paris, 1866–84).

CHAMBRE DES DÉPUTÉS, shän'br' dā dā'pų'tā'. The building in Paris in which the sessions of the French Legislature are held. It is called also "Palais du Corps Législatif" and "Palais Bourbon," and was built in 1722 for the Duchess of Bourbon, becoming national property in 1790. It fronts the Seine opposite the Pont de la Concorde. The style is that of a Greek temple, with 12 Corinthian columns. The steps and façade are ornamented with statues and reliefs.

CHAMBRE INTROUVABLE, shän'brăn'-trōō'va'bl'. The name given to a packed assembly of deputies in France which sat from October, 1815, to April, 1816. The epithet (meaning "chamber whose like cannot be found") originated with Louis XVIII, by whom, after his restoration, this chamber had been summoned. Louis, no doubt, used the term ironically, for he realized the injury which was sustained by his cause through the fanaticism of these deputies; but they, for the most part, accepted the name seriously as a compliment. The former chamber, which had shown much moderation, had been dissolved under the influence of the court party, and the ministry, led by Talleyrand, had exerted itself to procure the election of a submissive chamber. The ultra-Royalists were for a time in the ascendant. The number of the deputies was arbitrarily raised from 259 to 392, and many of the elections, especially in the south, took place under the supervision of the partisans of reaction or of foreign troops. At the elections in Nîmes more than 100 persons were

killed by the Royalist bands. At last, on October 7, the King opened the chamber, on which he enjoined quiet and moderation; but when, in one of the first sittings, Boyer d'Argenson asked for the intervention of the chamber in behalf of the Protestants, who were being slaughtered in the south by the ultra-Royalist bands, the speaker was called to order, and the chamber from that time ceased to observe any bounds or moderation. The fanatical legislation that followed inspired the ministers, the King, and especially the Emperor Alexander, with so much aversion and fear that the chamber was dissolved on April 5, 1816, an event which was received with universal rejoicing. The electoral law of Feb. 5, 1817, prevented the return of a similar chamber, and it was only by the modified electoral law of 1820 that ultra-royalism regained a predominating influence in the Parliament. See WHITE TERROR.

CHAMBURU, chäm-bo͞o′ro͞o. A species of papaw (q.v.); native of Brazil.

CHAMECK, shä-mĕk′ (Brazil). The coaita. See SPIDER MONKEY.

CHAMELEON, kȧ-mē′lê-ŭn (Lat. *chamæleon*, Gk. χαμαιλέων, *chamaileōn*, from χαμαί, *chamai*, on the ground + λέων, *leōn*, lion). An African lizard of the family Chamæleontidæ, of very peculiar form and structure, and placed at the head of the order Lacertilia. The body is much compressed, the dorsal line sharp, in some of the species rising into an elevated crest; the back of the head is also elevated into a sort of cone. The neck is very short and does not admit of the head being turned, for which, however, compensation is found in the remarkable powers of motion possessed by the large, prominent eyes, which move independently of one another and are covered with a membrane pierced only with a small hole for the pupil to look through. There are no external ears. The skin is not covered with scales, but, like shagreen, is rough with granules. The legs raise the body rather higher than in most of the saurians; the toes, both of the fore and hind feet, are divided into two sets —one directed forward and the other backward —so that each foot has the power of grasping like a hand. The tail is long and prehensile. The lungs are very large and are connected with air cells that lie among the muscles and beneath the skin, so that the animal has a remarkable power of inflating itself with air. The tongue is remarkably extensile and is the organ by which the animal seizes the insects which constitute its food, being darted at them with unerring aim, while a viscous saliva causes them to adhere to it, and they are carried with it into the mouth. For illustration of the chameleon's method of catching insects, see the article LIZARD.

The chameleons are slow in their movements, except those of the eyes and the tongue, and remain long fixed in one spot, awaiting the approach of insects, which they seize on their coming within reach. They all live among the branches of trees, but lay their large eggs (10 or 12) under leaves on the ground. Their power of fasting is great and, along with their gulping of air, gave rise to the fable, current among the ancients and until recent times, of their living on air, and led to other fables and to their ancient use in medicine. Their celebrated power of changing color is not equally fabulous, and may be used to render the animal less easy of observation, by assimilating it to the color of surrounding objects. It may depend in part on the action of light; it is certainly connected with the fear and other passions of the creature. Milne-Edwards has discovered that it depends upon the presence of two differently colored layers of pigment underneath a transparent skin. Both may show simultaneously, or blend, or one may replace the other. This power of changing color is possessed by many lizards and is explained more fully under METACHROSIS. One species (*Chamæleon vulgaris*) is found wild along the European shore of the Mediterranean and is often made captive.

American Chameleons are the small, slender lizards of the iguanid genus *Anolis*, very common throughout tropical America and represented in the southern United States by a single species (*Anolis carolinensis*), often also called "scorpion." It is 3 to 3½ inches long in body, with a tail 5 to 6 inches long. Below it is white, above emerald green, or the color of any natural object upon which it rests. Beneath the capacious mouth is a large dewlap, which "can be vertically expanded like a fan, when it is of a deep-red shade, or may be retracted so as to be scarcely visible." They are extremely active during the warm hours of the day, and extremely amusing as they dart and scramble about bushes, rocks, or buildings in search of insects, of which they destroy a vast number. In Jamaica and the Antilles they are often household pets. A closely allied tropical species is illustrated on the Colored Plate of LIZARDS. Consult Parker and Starratt, "The Effect of Heat on the Color Changes in the Skin of Anolis Carolinensis," *Proceedings, American Academy of Arts and Sciences*, vol. xl, No. 10 (Boston, 1904).

CHAMELEON. A southern constellation within the Antarctic polar circle.

CHAMFER (OF. *chamfrein*, *chamfrain*, of uncertain origin). In architecture, an angle or arris which is obliquely beveled or cut off is said to be chamfered. The chamfer is sometimes a *concave* or *hollow* chamfer; when it does not extend over the entire length of the arris, it is called a *stopped* chamfer. It was most used in mediæval architecture, and in Gothic buildings it is greatly varied and decorated. It is frequently employed in modern architectural woodwork.

CHAMFORT, shäN'fôr′, SÉBASTIEN ROCH NICOLAS (1741–94). A French epigrammatist, the best talker and raconteur of his generation in France. He was born in Auvergne, an illegitimate child, was educated on a scholarship in Paris, and achieved a distinction in classical studies that led him in afteryears to write, "What I learned I have forgotten. The little that I do know I have guessed." He left school to become an abbé, "a costume, not a profession," he said, adding when offered a benefice that he "preferred honor to honors." For the moment, however, he got neither. Booksellers declined his books, and for a year he lived by writing other people's sermons and on chance journalistic crumbs. Then he won an academic prize and became the fashion in the literary salons, where he led a life of gallantry from which he had presently to seek rest and recuperation at Spa and elsewhere. Returning, he wrote a successful drama, *La jeune Indienne* (1764). He made a living—scanty, to be sure—more by his tongue than by his pen, paying for his entertainment by the diversion that he gave to his hosts, especially Madame Helvétius, and

Chabanon, who resigned to him a pension of 1200 livres on the *Mercure de France*. Occasionally he won academic prizes, as by his eulogies on Molière and La Fontaine. But with every epigram his reputation grew. The King added 1200 livres to his pension, and the Prince de Condé made him his secretary, a post that he found uncongenial to his Bohemianism. He withdrew to Autreuil and married a clever woman of 48, who died six months after. Then he went to Holland, but returned to accept a seat in the Academy in 1781. An unfortunate and mysterious love affair soon made him quit the court forever; but he gathered about him at the house of M. de Vaudreuil a congenial circle, which included Mirabeau (q.v.), whom Chamfort helped with his orations. He worked actively for the Revolution with tongue and pen, for a time as secretary of the Jacobin Club and as street orator. He was among the stormers of the Bastille. But, with the fall of the Girondists, his political life ended, and his criticisms of the Terrorists soon made them anxious to silence his bitter tongue with the guillotine. This he escaped by suicide with dagger and pistol. He did not die immediately, however, but lived to bequeath to the world two final epigrams. "I declare," he dictated—and signed the declaration with his blood before the police who came to arrest him—"that I wished to die free rather than be led slave to prison." To the Abbé Sieyès, who owed his political fortune to Chamfort's epigram on the Third Estate, "It is everything and has nothing," he said, as his last word, "I am going at last from a world where the heart must either break or turn to bronze." No writing of Chamfort's is worth recalling save his aphorisms (*Maximes et pensées*), which, after those of La Rochefoucauld, are the keenest, the most incisive, and the most pregnantly cynical in modern literature. They are restrained in utterance, violent in implication, subtle in manner, iconoclastic in effect. Chamfort's *Œuvres complètes* is in 5 vols. (1824–25); a selection from his writings appeared as *Œuvres de Chamfort* (1852), with a critical preface by Houssaye. In 1879 appeared *Œuvres choisis* (2 vols.), with preface and notes by M. de Lescure. Consult Sainte-Beuve, *Causeries du lundi*, vol. iv (Paris, 1857–62), and Pelisson, *Chamfort, Étude sur sa vie, son caractère et ses écrits* (Paris, 1895). See EPIGRAM.

CHAMFRON, chăm'fron, or **CHAMFRAIN,** chăm'frŏn (Fr. *chanfrein*, of uncertain origin). A frontlet of metal, forming part of the armor worn by a charger in late mediæval times. It protected the forehead, eyes, and nostrils, and was frequently provided with a projecting spike. It came into use about the beginning of the fourteenth century. In the fifteenth century the chamfron was sometimes adorned with precious metals and became an object of great cost. To prevent shying in tourneys, the chamfron was often made so that the horse could see nothing in front of him. See illustration under CAVALRY.

CHAMIDÆ, kăm'ĭ-dē (Neo-Lat. nom. pl., from Gk. χαίνειν, *chainein*, to gape). A group of curious marine Pelecypoda, allied to the genus *Cardita*, and having shells with unequal valves, that exhibit a tendency to spiral development of the beaks. In the recent forms and many of the fossil representatives, which are far more numerous than those now living, one of the valves is attached to some supporting object by direct cementation of the outer wall of the valve, and there is usually a considerable thickness of the shell wall of this valve. The only living genus, *Chama*, is less different from the normal clam form, as seen in *Cardita*, than are its numerous fossil relatives from the Mesozoic and Tertiary rocks. *Chama* has a shell of which the larger (attached) valve is convex with a somewhat spiral nonelevated beak, and a smaller spiral flattened valve that suggests a lid for the larger one, which latter contains in its cavity the bulk of the animal. This genus, with about 55 living species, is found abundantly in warm seas, especially the Red Sea and the Indian Ocean, where its shells are common on coral reefs, fastened into the cavities of the coral masses. Fossil species of *Chama*, little different from the modern forms, are found first in the Cretaceous rocks, and the genus attained its maximum in the Eocene, when it was quite abundant in the European Mediterranean Sea of that period. The related fossil genera, found in the Mesozoic rocks, present some curious forms, due to extreme inequality or to spiral extension of the beaks of the valves. *Diceras*, of the Upper Jura, has the two valves of slightly unequal size, with their beaks twisted spirally outward, so that they resemble a pair of ram's horns. *Requienia*, of the Cretaceous, resembles a turreted gastropod with the aperture of its spirally rolled larger (left) valve closed by the operculum-like flattened right valve. Other allied genera are *Monopleura*, *Caprina*, etc., all from the Cretaceous rocks. For description of similar and closely allied, though even more aberrant, fossil pelecypods, see the articles on HIPPURITES; and, for illustrations, see RUDISTÆ.

CHAMIER, shà-mēr', FREDERICK (1796–1870). An English novelist. He was born in London, entered the navy in 1809, and distinguished himself in the American War of 1812. He retired in 1833 and was promoted captain in 1856. The success of Marryat in depicting sea life led Chamier to enter the same field, in which he was not without success, though in invention and humor he falls short of his model. His best romances are: *Ben Brace* (1835); *The Arethusa* (1836); *Life of a Sailor* (1837); *Jack Adams* (1838); *Tom Bowling* (1841); *Jack Malcolm's Log* (1846). All of his novels have been translated into German. He also wrote a *Review of the French Revolution of 1848* (1849), in which he gives a prejudiced view of some of the prominent actors.

CHAMINADE, shà'mē'nàd', CÉCILE LOUISE STÉPHANIE (1861–). A French composer, born in Paris. She studied under Le Couppey, Savard, Marsick, and Godard, and made her début as a pianist when 18. Her compositions at one time enjoyed great popularity, because of their melodiousness and piquant rhythm. For a time she was vastly overrated. Although her visit to the United States in 1908 proved very successful for the moment, she failed to regain her hold on the musical public. Among her best-known instrumental pieces are: *La lisonjera* ('The Flatterer'); *Pas des amphores; Pas des écharpes* ('Scarf Dance'); *Au matin* for two pianos; *Callirhoë*, a ballet symphony performed first in 1888 in Marseilles; *Les amazones*, a lyric symphony; two suites for orchestra; a concert-stück for piano and orchestra. Her songs also were formerly in great vogue.

CHAMISO, chà-mē'sō. A plant of the order Rosaceæ. See Colored Plate of CALIFORNIA SHRUBS.

CHAMISSO, sha-mês'sō, ADELBERT VON (1781–1838). An eminent German poet and naturalist. Although born in Champagne, France, he in childhood shared the exile of his parents, fleeing from the terrors of the French Revolution. In 1796 he became a page of the Queen of Prussia, and though his parents afterward returned to France, education had made Germany more congenial to his poetic nature, and he identified himself wholly with his adopted country. In 1798 he entered the army as ensign and in 1801 became lieutenant. He showed his interest in the military calling by two technical treatises published in 1798 and 1799. Already he had joined a romantic brotherhood, which included several young men destined to fame, Varnhagen, Hitzig, De la Motte-Fouqué, and others. He studied Homer diligently, translated much into German, and in 1803 essayed a *Faust*, the only one of his early poems preserved in his *Works*. He also cooperated as editor of the *Musenalmanach* (1804–07). In 1806 he resigned from the army and went to France, hoping to secure a position as teacher in the gymnasium at Napoléonville; disappointed in this, he spent several years in futile and discontented Bohemian wanderings. He was in France again in 1810, when he undertook to turn into French Schlegel's noted *Lectures on Art and Literature*, staying with him and Madame de Staël at Chaumont, and later following her to Coppet, where her relations with Jean de Rocca brought him to his senses. Here he began to study botany under Aug. de Staël, and in 1812 he matriculated as a student of medicine in Berlin. In the next year, during the War of Liberation, he retired to Kunersdorf, and while there wrote his most noteworthy prose work, *Peter Schlemihl*, a wonderful tale of the loss of a shadow by compact with the devil—an idea familiar to folk-lore and already developed by Goethe in his *Marchen*, and by Körner in his *Teufel von Salamanca*, but here given its enduring and classic form. He took part in Captain Kotzebue's Russian polar expedition (1815–18), and in 1835 published in a *Journal* an account of it which in style and power of description is among the classics of travel. He returned to Berlin in 1819, and was appointed assistant custodian of the botanical garden. While here he married Antoine Piaste. Having recovered an indemnity of 100,000 francs for his French estates, he visited Paris in 1825. His greatest literary activity dates from his return, when he settled down to domestic life and peaceful production stimulated by the genial companionship of his wife, to whose inspiration we owe especially the charming poetic cycles *Frauen-Liebe und -Leben*, and *Lebens-Lieder und -Bilder*. He also made an admirable translation of the *Song of Thrym*, from the *Edda*, and many versions of poems in other languages. From 1832 till his death he was editor of the *Musenalmanach*, which he made an annual of much literary importance. His poetry is rather small in amount, but widely popular in Germany. Some of his lyrics, ballads, and romances rank among the finest in German literature, especially *Das Schloss Boncourt*, *Die alte Waschfrau*, and *Die Kreuzschau*. His international reputation rests on the many translations of his *Peter Schlemihl*. His collected *Works* fill 6 vols. (Leipzig, 1836–39; 6th ed., Berlin, 1874), containing also his *Biography* by Hitzig and his *Letters*. Consult also: Fulda, *Chamisso und seine Zeit* (Leipzig, 1881); Du Bois-Reymond, *Chamisso als Naturforscher* (Leipzig, 1889); Kossmann, *Der deutsche Musenalmanach, 1833–1839* (The Hague, 1909); and Geiger, *Aus Chamissos Fruhlingzeit* (Berlin, 1905).

CHAMOIS, shăm'mi, *Fr. pron.* shă-mwȧ' (Fr., It. *camozza;* probably from MHG. *gemeze, gemz*, Ger. *Gemse*, chamois; cf. also Sp., Portug. *gamo*, fallow deer), or GEMSE. A goat antelope (*Rupicapra rupicapra* or *tragus*), inhabiting the high mountains of southern Europe. It occurs in the Pyrenees, where it is called "izard"; in the mountains of the coasts of Spain, Dalmatia, and Greece; in the Alps, Carpathian, Caucasus, and Taurus ranges, and in Georgia. The izard of Spain and the atchi of the Caucasus and beyond differ somewhat from the typical chamois of Tirol, but only as local races. The chamois is about the size of a large goat, but the neck is longer in proportion, and the body shorter. The color is brown, deeper in winter than in summer; the tail is black, the head a pale yellow, with a dark-brown band along each cheek. The horns, seldom more than 6 or 7 inches long, rising nearly straight up from the forehead, are black and so bent back at the tip as to form a hook. (See Plate of GOAT ANTELOPES.) The usual summer resort of the chamois is in the higher regions of the mountains which it inhabits, not far from the snow line, and it is often to be seen lying on the snow. In winter it descends to the higher forests, where, indeed, the females and their young fawns spend most of the time. The aromatic and bitter plants of the mountain pastures are its favorite food. Flocks of 100 are sometimes seen; but in the Swiss Alps, where the numbers have been much reduced by hunting, the flocks are generally very small and often consist only of a few individuals. Old males often live solitarily. The chamois produces one or two young at a birth, in May or June.

It is an animal of extraordinary agility, and flocks may often be observed sporting in a remarkable manner among the rocky heights. It can leap over ravines 16 to 18 feet wide; a wall 14 feet high presents no obstacle to it; and it passes readily up or down precipices which almost no other quadruped could attempt. It is said to descend obliquely almost perpendicular precipices of more than 20 feet, striking its feet once or twice against the rock, as if to stay and guide its descent, and alighting securely, often on a very narrow ridge of rock, with its hind feet first, and bringing the fore feet almost into contact with them. When a flock of chamois are feeding (usually early in the morning), one is always on the watch, and by a sort of whistle announces apprehended danger.

The hunting of the chamois is attended with great hardship and much danger, but calls forth the highest qualities of both sportsmanship and mountaineering, since no great numbers exist, nor is any free hunting to be had except in the remotest and loftiest Carpathians, or else in Persia. This is due to the fact that for many years the Alpine resorts, and much of the region to the eastward, have been most strictly preserved by royal decree or private ownership, and only a very limited number of animals permitted to be killed annually; yet much poaching is done. The finest and proper way is to stalk the quarry alone, or with only a guide, but battue methods are frequently followed in Bavaria and Transylvania. The flesh of the chamois is highly esteemed. Its skin is made into leather, and from it the original "shammoy," or "shammy

leather," so much prized for softness and warmth, was obtained. (See LEATHER.) Its horns and hoofs are mounted as ornaments, alpenstock handles, etc., and form a valuable article of trade at mountain resorts. When taken young, the chamois is easily tamed.

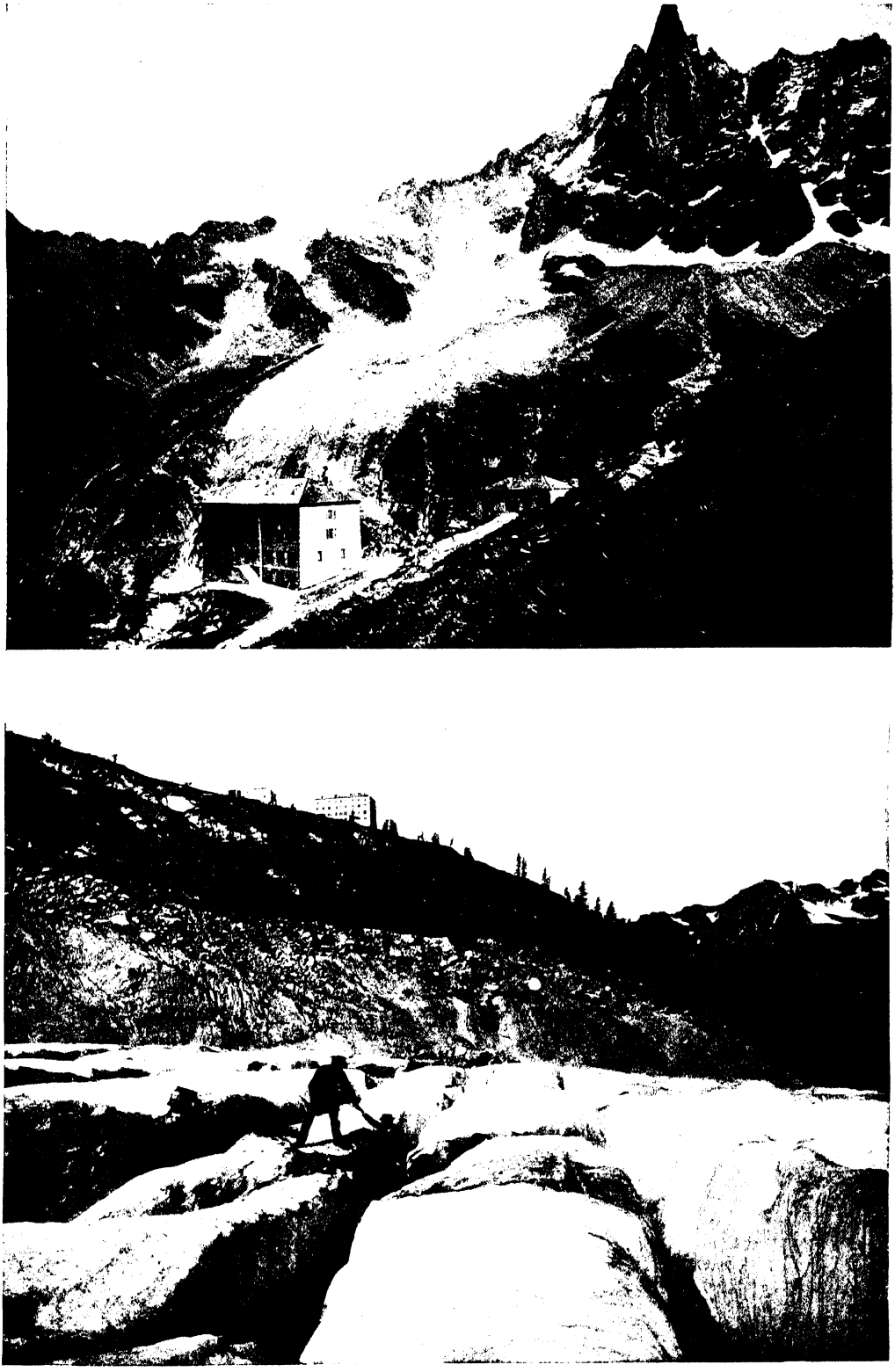
CHAMOMILE, kăm'ō-mil, or **CAMOMILE** (OF. *camamille,* ML. *camamilla,* Lat. *chamomilla,* from Gk. χαμαί, *chamai,* on the ground + μῆλον, *mēlon,* apple). A genus of plants of the natural order Compositæ, suborder Tubulifloræ, distinguished by imbricated bracts, a scaly conical receptacle, a ray of one row of female florets, those of the disk hermaphrodite, the achænia obscurely four-cornered, and destitute of pappus. The species are annual and perennial herbaceous plants, chiefly natives of Europe and other temperate parts of the world. The common chamomile (*Anthemis nobilis*), the Roman or true chamomile, the most important species of the genus, well known for its medicinal virtues, is a perennial plant with a stem about a foot long, procumbent and much branched, each branch terminated by a flower (head of flowers) more than an inch broad, with yellow disk and white ray, the whole plant intensely bitter and highly aromatic. It contains a bitter principle, tannin, and a volatile oil, *oil of chamomile,* which abounds most of all in the involucre. The dried flowers are used in medicine; the infusion, or "tea," made from them is used to a slight extent as a stomachic tonic, especially in convalescence. The German chamomile, or *Matricaria,* consists of the flowers of *Matricaria chamomilla.* This is called wild chamomile in Great Britain. Its flowers are smaller and the taste and odor stronger and less pleasant. This plant is so abundant in some parts of the south of England as to fill the whole air with its scent. The other British species of chamomile are mere weeds; one of them (*Anthemis cotula*) is so acrid as to blister the fingers if much handled. The flowers of the oxeye or dyer's chamomile (*Anthemis tinctoria*), a native of many parts of the continent of Europe, yield a beautiful yellow dye, on account of which the plant is often cultivated.

CHAMONIX, shà'mō'nē', or **CHAMOUNI,** shà'mōō'nē' (Lat. *Campus munitus*). The name of a wild and romantic valley and village among the Alps in the Department of Haute-Savoie, France. It lies at an elevation of about 3400 feet above sea level, is about 13 miles long and 1 mile broad, and is traversed by the Arve. It begins at the northeast, from the Col-de-Balme, over which there is a mule path to Martigny, in the upper valley of the Rhône. From the other end issues the road to Geneva, which is 53½ miles from Chamonix. On the north side lie Mont le Brévent and the chain of the Aiguilles Rouges, and on the south is the giant group of Mont Blanc, with its enormous glaciers. The chief of these glaciers are the Glacier des Bossoms, des Bois, d'Argentière, and du Tour. By ascending to a point called Montanvert, we come upon the upper course of a glacier, where it expands into a great mountain lake of ice called the Mer de Glace, in which there is a solitary rock or oasis called Le Jardin, about 7 acres in extent, and covered with the most beautiful herbage. Until 1741 the valley was almost unknown; the region was considered a wilderness, and known by the name of Les Montagnes Maudites, or 'accursed mountains.' In that year it was visited by two Englishmen, Pococke and Wyndham, who ascended as far as Montanvert. It was only, however, in 1775 that the attention of travelers was effectually called to it by Saussure and Bourrit. The valley is rich in peculiar plants and furnishes an aromatic and perfectly white honey. The village of Chamonix owes its origin to the Benedictine convent founded between 1088 and 1099. The inhabitants depend for a livelihood partly upon the tourists who visit the valley and partly upon the pastures and upon hunting. There are several good hotels, and the best guides are to be found here for the neighboring Alps. It is from Chamonix that Mont Blanc is usually ascended. Consult Whymper, *Chamonix and the Range of Mont Blanc* (London, 1896).

CHAMOUCHOUAN (shä'mōō-chwän') **RIVER,** or ASHUAPMOUCHOUAN. A northwestern affluent of Lake St. John (q.v.), Quebec, Canada, and the outlet of Chamouchouan, Obatogaman, Shabogama, and other lakes of the district.

CHAMPAGNE, shăn'pā'ny' (Fr., flat country, It. *campagna,* Lat. *campania,* plain, from *campus,* field). A former province of France, now included within the departments of Marne, Haute-Marne, Seine-et-Marne, Aube, Ardennes, Aisne, and Yonne. The province was about 180 miles long by 150 broad, its surface presenting extensive plains with ranges of hills, especially in the north and east, from the vineyards of which is produced the famous champagne wine. In ancient times Champagne was subjugated by Cæsar, and afterward was annexed to the kingdom established by the Franks. After the tenth century it had its own counts, who were vassals of the French kings. The capital was Troyes. By the marriage of Philip IV with Joanna, heiress to the Kingdom of Navarre, in 1284, Champagne and Brie came to the French crown and were incorporated in 1361.

CHAMPAGNE, shăn'pā'ny', or **CHAMPAIGNE,** PHILIPPE DE (1602–74). A French religious and portrait painter, of Flemish extraction. He was born in Brussels, studied under Fouquières, Jean Bouillon, Michel de Bordeaux, and at 19 removed to Paris. There he was associated with Nicolas Poussin in decorating the Luxembourg Palace and several convents for Queen Maria de' Medici. Later he was in the service of Louis XIII and Richelieu, whose portraits he painted many times, besides those of the Queen, Turenne, Mazarin, Henrietta Maria of England, and other celebrated personages. A series of family misfortunes deepened his naturally strong religious convictions and led to a close connection with the Jansenists of Port Royal, for whom he painted the magnificent altarpiece of the "Last Supper" (Louvre). One of his best portraits is the touching likeness of his daughter Catherine, who had become a nun. Among other religious pictures dating from this time is the series of the "Life of St. Benedict" (Brussels). In his latter years his nephew, Jean Baptiste, was associated with him in painting the frescoes in the royal apartments at Vincennes and the Dauphin's room in the Tuileries. Philippe de Champagne happily combined the realism of Flemish art with the spiritual qualities of the French. Although somewhat lacking in imagination and cold in color, especially in his later pictures, he is nevertheless a painter of the first rank, and many of his portraits are veritable



CHAMONIX

HOTEL AND AIGUILLE DU DRU (UPPER)
MER DE GLACE AND HOTEL (LOWER)

masterpieces. The Louvre is richest in his works, which are also in most European collections, in the Boston Museum ("Arnaud d'Andilly"), and in the Museum of the New York Historical Society. For his biography, consult A. Gazier (Paris, 1893) and Stein (ib., 1891).

CHAMPAGNE (shăm-pān') **WINE.** See WINE.

CHAMPAGNY, shăN'pâ'nyê', FRANÇOIS JOSEPH NOMPÈRE DE (1804–82). A French publicist, born in Vienna, where his father (see the next title) was French Ambassador. He was a member of the Neo-Catholic party and with Montalembert contended for Catholic schools of instruction independent of the University of France. He contributed to the *Correspondant* and *Ami de la Religion.* In 1869 he was elected to the French Academy for his most pretentious work, a history of the Roman Empire: *Les Césars* (4 vols., 1841–43), *Les Antonins* (3 vols., 1863), and *Les Césars du IIIe siècle* (3 vols., 1870).

CHAMPAGNY, shăN'pâ'nyê', JEAN BAPTISTE NOMPÈRE DE, DUC DE CADORE (1756–1834). A French courtier and diplomat, born at Roanne. He served in the American Revolution. In 1789 he was elected to the States-General, and as a supporter of the Third Estate became a prominent member of the General Assembly. During the Reign of Terror he was imprisoned (1793), but was released after Robespierre's fall, and was made a Councilor of State by Napoleon (1799). He became Ambassador to Vienna (1801–04), Minister of the Interior (1804–07), and Minister of Foreign Affairs (1807–11). In 1809 he accompanied the Emperor to Austria, where he negotiated the Treaty of Vienna, and he helped arrange the marriage with Marie Louise. He quarreled with Napoleon in 1811, but joined him during the Hundred Days. After the restoration of the Bourbons (1814) he retired from public life, but in 1819 was restored to the Chamber of Peers.

CHAMPAIGN, shăm-pān'. A city in Champaign Co., Ill., 128 miles south by west of Chicago, on the Illinois Central, the Cleveland, Cincinnati, Chicago, and St. Louis, the Illinois Traction and the Wabash railroads (Map: Illinois, D 3). It is situated in an agricultural region and has an ice and cold-storage plant, railroad shops of the Illinois Central, extensive foundries, and tool and textile factories. It is the twin town of Urbana, which contains the University of Illinois, and it has a fine public library, several parks, and a high school. Settled in 1855, Champaign was incorporated five years later. Its government is administered by a mayor, elected every two years, and a city council. The electric light plant is owned by the city. Pop., 1900, 9098; 1910, 12,421.

CHAMPAIGNE, PHILIPPE DE. See CHAMPAGNE, PHILIPPE DE.

CHAMP DE MAI, shăN de mâ. See CHAMP DE MARS.

CHAMP DE MARS, märs (Fr., Field of Mars, Lat. *Campus Martius*). The name given to the annual meetings held in the month of March by the Franks of Gaul in the fifth century and later. These were either national assemblies called for the purpose of deliberation upon important matters and for the trial of important cases, or else military reviews. The Champs de Mars were not held as frequently under the later Merovingians, but were revived by Pepin, who held his meetings, however, in May (hence the name CHAMP DE MAI). Under Charles the Great similar meetings were held in one of the summer months and had varied functions.

CHAMP DE MARS (Fr., Field of Mars). A great parallelogram in Paris, between the Seine and the Ecole Militaire, formerly used especially for military purposes and drills. It is 1093 yards long and 537 wide, with four rows of trees on each side, and until 1861 it was surrounded by high embankments. It has been the scene of many remarkable political and public celebrations, from the Feasts of the Federation in 1790 and of the Champ de Mai in 1815, to the universal expositions of 1867, 1878, and 1889. For the last the Eiffel Tower was built at one end of the Champ.

CHAMPEAUX, shăN'pô', GUILLAUME DE. See GUILLAUME DE CHAMPEAUX.

CHAMPERICO, chăm'pâ-rē'kô. A port of Guatemala, situated on the Pacific coast, at the mouth of the Salamo, 100 miles southwest of Guatemala (Map: Central America, B 3). The town is connected with Acapulco, Mexico, by steamship and with the interior by railroad and is the residence of a United States consular agent. Its chief article of export is coffee. Pop., 1500.

CHAMPERTY, shăm'pēr-tĭ, or **CHAMPARTY** (OF. *champart*, from ML. *campipars, campars, campartagium*, from Lat. *campi pars*, part of the field, from *campi partitio*, a division of lands). The common-law offense of promoting or maintaining a suit for the purpose of sharing in the proceeds. The practice has been strictly forbidden by statute in England from very early times (3 Edw. I, c. 25; 13 Edw. I, c. 49; etc.) and gave rise to a tort action for damages and subjected the offender also to criminal liability. In Scotland the rule of the civil law by which the *pactum de quotâ litis* was held to be a *pactum illicitum*, and as such void, has all along been part of the common law. Such practices were also forbidden by statute to members of the college of justice (1594, c. 216). There is this difference between the laws of the two countries, however, that whereas in England the offense has always been punished criminally, in Scotland the only penalty which it entails, beyond nullity of the bargain, is deprivation of office. According to Blackstone, the word "signifies the purchasing of a suit, or a right of suing—a practice so much abhorred by our law that it is one main reason why a chose in action, or thing of which one hath the right but not the possession, is not assignable at common law, because no man should purchase any pretense to sue in another's right."

In many of the United States, however, champertous agreements are authorized by statute; and, both in England and in this country, the prevailing tendency is towards freedom of contract between litigant and lawyer, and between the owner of a *chose in action* (q.v.) and any one who is willing to buy it. See MAINTENANCE.

CHAMPFLEURY, shăN'flē'rē'. The pseudonym of Jules Fleury-Husson (1821–89). A French novelist and miscellaneous writer, born at Laon. His early work was an essential, if an apparently accidental, contribution to the naturalistic movement in French fiction, though most of his novels are romantic. In these he appears as a quiet and genial observer of the follies of mankind, not a satirist of its vices.

In *Chien-Caillou* (1847), and especially in his best novel, *Les bourgeois de Molinchart* (1854), he forms a most interesting connecting link between Balzac in his *Scènes de la vie de province* and Flaubert (q.v.) in the epoch-making *Madame Bovary* (1856). Champfleury wrote also three volumes of *Etudes littéraires*, and a *Bibliographie céramique*, based on the collections of the porcelain manufactory at Sèvres, of which, in 1872, he was made custodian. Consult Troubat, *Souvenirs sur Champfleury et le Réalisme* (Paris, 1905). See REALISM AND NATURALISM.

CHAMPION (from ML. *campio*, combatant, from *campus*, [battle]field). In the judicial combats of the Middle Ages women, children, and aged persons were usually allowed to appear by deputy in the lists. Such a deputy was called a champion. Those who followed this profession were frequently of a low class and were regarded as disreputable and in case of defeat were liable to equal punishment with their clients. Sometimes they were obliged to wear a peculiar armor and dress of leather and were not allowed to fight on horseback. Champions are mentioned as early as the time of Charlemagne. A noble was not required to meet a plebeian, nor were the clergy allowed to enter the lists. In the age of chivalry the champion was a knight, who entered the lists in behalf of an injured lady, or child, or any one incapable of self-defense. The term "champion" was also applied to the knight who saw that no injury or insult was offered to ladies at tournaments. In England, formerly, on coronation day a knight fully armed would challenge all who denied the King's right to the throne. The custom, which dates back to William the Conqueror, became, in the time of Richard III, the hereditary right of the Dymoke family and was last observed at the coronation of George IV.

CHAMPION HILLS. A group of hills in Hinds Co., Miss., 20 miles east of Vicksburg, where, May 16, 1863, during the Civil War, a Federal force of about 15,000 (actually engaged), under General Grant, defeated a somewhat larger Confederate force under General Pemberton, the battle lasting about four hours, and the losses in killed, wounded, captured, and missing being about 2450 for the Federals and 5500 for the Confederates (Map: Mississippi, D 6).

CHAMPLAIN, shăm-plān'. A lake lying between Vermont and New York (Map: New York, G 1). It is 110 miles long and increases in width from ¼ of a mile in the south to 13 miles in the north. Its area is about 600 square miles, of which two-thirds is in Vermont. The northern extremity extends 6 miles into Canada. It is about 95 feet above the sea, has a maximum depth of some 300 feet, and is navigable for the largest vessels. It is drained at the north by the Richelieu River (q.v.), which empties into the St. Lawrence. It is connected with the Hudson by a canal from Whitehall. Its principal islands are those composing Grand Isle Co., Vt. Grand Isle, 12 miles long and 1 to 4 miles wide, contains two townships—Grand Isle and South Hero. North Hero, 14 miles long, 2 to 3 miles wide, and Isle La Motte, 6 miles long and 1 to 2 miles wide, are the other main islands of the group. Alburg Peninsula, about 12 miles long and projecting south from Canada into the lake, completes the territory of Grand Isle County. The general shore line is sinuous and offers many fine bays and bold promontories. The scenery in this region is beautiful. The Green Mountain Range (q.v.) lies about 20 miles east of the lake; on the west are the Adirondacks. The chief towns along the water line are Rouse Point, Plattsburg, Port Henry, Crown Point, and Whitehall in New York, and Burlington in Vermont. Lake Champlain receives the discharge of Lake George and of several small rivers. It was discovered by Samuel de Champlain in 1609, who gave it his own name. Its amphitheatre was the scene of much activity during the French and Indian War and also during the American Revolution. The Champlain Society, with headquarters at Toronto, has published important historical writings dealing with the history of New France. In July, 1909, a celebration in Lake Champlain in honor of the tercentenary of its discovery assumed an international character.

The Battle of Lake Champlain. The name given to a decisive naval engagement of the War of 1812, fought off the town of Plattsburg, on Sept. 11, 1814, between a British fleet under Capt. George Downie and an American squadron under Com. Thomas Macdonough. In July, 1814, a British army of about 11,000 men, under Sir George Prevost, undertook the invasion of New York, by the way of the western shore of Lake Champlain. To reenforce this movement it was necessary, however, to dispose of the small American fleet which was then at Plattsburg. In preparation for the coming naval battle, both sides increased their strength by the building of ships. On September 11 the British fleet entered Plattsburg harbor and assailed the American squadron, which was awaiting their attack at anchor. Macdonough had chosen an advantageous position, with his line of battle so disposed as to make it impossible for the enemy to turn either flank. The two fleets were about equally matched in fighting strength, the American squadron numbering 14 vessels of some 2250 tons, with 882 men and 86 guns; while the strength of the British comprised 16 vessels of 2400 tons, with 937 men and 92 guns. The advantage in training and seamanship was probably on the side of the British. The battle lasted about two and one-half hours and ended in a victory for the Americans. Owing to the close range at which the ships engaged, the loss was heavy on both sides, the Americans losing about 200, as against more than 300 for the British. As a result of the battle, the plan of British invasion by land was abandoned, and Prevost retreated in haste to Canada. The victory was also effective in hurrying on the close of hostilities. Consult: Roosevelt, *The Naval War of 1812* (New York, 1882); Johnson, *History of the War of 1812–15* (New York, 1882); Mahan, *Sea Power in its Relations to the War of 1812* (2 vols., Boston, 1905).

CHAMPLAIN, SAMUEL DE (1567–1635). A French explorer and colonizer, the founder of Quebec, and the most prominent figure in the early history of New France. He was born at Brouage, in Saintonge, the son of a ship captain; received a careful training in the principles of navigation and cartography; entered the army, and served in Brittany as quartermaster of cavalry under D'Aumont, Saint-Luc, and Brissac. In 1598 he accompanied his uncle, recently appointed pilot general of Spain, when the latter carried home from Blavet the Spanish soldiers who had served in France as allies of the Leaguers, and in January, 1599, he was placed in command of the *Saint-Julien*, which,

with several other vessels, started at that time for the West Indies. After an absence of more than two years, during which he visited various Spanish settlements in America, including Mexico City and New Granada, Champlain returned to France and made a careful report of his observations to Henry IV. This report, entitled *Bref discours des choses plus remarquables que Samuel Champlain a reconnu aux Indes Occidentales*, remains in manuscript at Dieppe and was not printed in the original until 1870, though an English translation was published by the Hakluyt Society in 1859. In it Champlain suggests the building of a canal across the Isthmus of Panama, "by which," he says, "the voyage to the South Sea would be shortened by more than 1500 leagues." In 1603 he accompanied the expedition sent out by Amyar de Chastes to choose a site for a proposed settlement, explored the St. Lawrence to the Lachine Rapids and the Saguenay for 30 or 40 miles, and soon after his return published a small work entitled *Des sauvages: ou voyage de Samuel Champlain de Brouage fait en la France Nouvelle*, which, together with his other works, has been of the utmost value to historians and gives an especially interesting account of the character and habits of the Indians. In the following year Champlain went to America with De Monts (q.v.), who, on De Chastes's death (1603), had secured the privilege of colonizing Acadia, and during the next three years, in the course of four separate voyages, explored the Bay of Fundy and the New England coast from the mouth of the St. Croix to Vineyard Sound, though he also spent much of his time during this period at the settlement which was established first at St. Croix and afterward at Port Royal, near the present Annapolis, Nova Scotia (q.v.). In 1607 he returned with the discouraged colonists to France, but in 1608 came again to America, this time as Lieutenant Governor (an office which he held until his death), and on July 3 began to lay the foundations of Quebec (q.v.).

In 1609 he accompanied a band of Montagnais, Huron, and Algonquin Indians on an expedition against the Iroquois, discovered the lake which bears his name, and on July 30, near the present Ticonderoga, was instrumental in defeating a band of Mohawks—an event of great historical importance, since it definitely committed France to the policy, probably adopted by Champlain, whereby the French endeavored, by antagonizing the Five Nations, to secure the alliance of the diverse tribes of Canada, while the Iroquois were impelled to unite first with the Dutch and afterward with the English. From 1609 until his death Champlain spent part of almost every year in France, zealously looking after the interests of the colony, and while in Paris in 1610 he married Mademoiselle Hélène Boullé, then only 12 years of age, who, however, did not come to Canada until 1620. In 1610 he again took an active part in a battle with the Iroquois, who had formed a barricade of trees near the Sorel, and in 1611 he established a temporary trading post on the site of the present Montreal. On the reorganization of the government of New France in 1612, he was reappointed Lieutenant Governor under De Soissons, and subsequently held this position under the Prince de Condé, the Duc de Montmorency, the Duc de Ventadour, and Cardinal Richelieu. In 1613, lured by the tales of one Vignau, who claimed to have found a great lake at the sources of the Ottawa and a salt sea not far distant, Champlain proceeded up the Ottawa as far as Allumette Island. Two years later he accompanied a band of Indians, known as "The Great War Party," on an expedition against the Iroquois, and, after a circuitous journey by way of the Ottawa, Lake Nipissing, Georgian Bay, Trent River, and Lake Erie, unsuccessfully attacked the great Seneca fortress, probably near the eastern end of Oneida Lake in New York. This was the last of his expeditions either for war or for exploration, and he passed the rest of his life for the most part in Quebec and in Paris. In 1619 he published a third volume, *Voyages et découvertes faites en la Nouvelle France, depuis l'année 1615 jusques à la fin de l'année 1618;* and in 1632 he issued his last work, *Les voyages de la Nouvelle France occidentale, dicte Canada, faites par le Sieur de Champlain Xainctongeois . . . et toutes les découvertes qu'il a faites en ce pais depuis l'an 1603 jusques en l'an 1629*, which is in part an abridgment of his three previous works relating to Canada. In July, 1629, he was forced to surrender Quebec to an English fleet under Gervaise Kirke, and, after being detained for some time as a prisoner in England, he went to France, whence, in 1633, he again came to Quebec (New France having been restored by England in the previous year), and there on Christmas Day, 1635, he died.

Bold and intrepid, farseeing and resourceful, tactful in his dealings with his white subordinates and his red allies, born to command, and thoroughly imbued with the spirit of adventure and discovery, he was the real founder of French power in America, and richly earned his title, "The Father of New France." "Of the pioneers of the North American forests," says Parkman, "his name stands foremost on the list. It was he who struck the deepest and boldest strokes into the heart of their pristine barbarism. . . . His character belonged partly to the past, partly to the present. The *preux chevalier*, the crusader, the romance-loving explorer, the curious knowledge-seeking traveler, the practical navigator, all found their share in him. . . . His books mark the man—all for his theme and purpose, nothing for himself. Crude in style, full of the superficial errors of carelessness and haste, rarely diffuse, often brief to a fault, they bear on every page the palpable impress of truth." In 1870 a complete edition of Champlain's works was issued under the editorship of Laverdière and Casgrain, as *Œuvres de Champlain, publiées sous le patronage de l'Université Laval* (6 vols., Quebec, 1870), and an English translation of the *Voyages* was published by the Prince Society, under the title, *Voyages of Samuel de Champlain, Translated from the French by Charles P. Otis, with Historical Illustrations and Memoir by Rev. E. F. Slafter* (3 vols., Boston, 1878–82), Grant (ed.). Consult also *Voyages of Samuel de Champlain, 1604–1618* (New York, 1907). For sketches of Champlain, consult: Dionne, *Champlain* (Toronto, 1905); Parkman, *Pioneers of France in the New World* (Boston, 1865); Winsor, *Narrative and Critical History of America*, vol. iv (8 vols., Boston, 1886–89); G. Gravier, *Vie de Samuel Champlain* (Paris, 1900); and an excellent, though brief, biography by Sedgwick in the "Riverside Biographical Series" (Boston, 1902); Dix, *Champlain, the Founder of New France* (New York, 1903); Colby, *Canadian Types of*

the Old Régime (New York, 1908); Gosselin, "Champlain et Hudson," *Proceedings, Royal Society of Canada*, 3d series, vol. iii (Ottawa, 1910); *Report, New York Lake Champlain Tercentenary Commission* (Albany, 1911); Hanotaux, *La France vivante en Amérique du Nord* (Paris, 1913). See CHAMPLAIN (lake).

CHAMPLAIN STAGE. A series of marine clays with interbedded sands and gravels found in the St. Lawrence and Champlain valleys that was deposited during Glacial time, when those valleys were occupied by arms of the sea. The beds were formed probably after the ice sheet had retreated northward into Canada. They mark a very considerable depression of the land surface in that section, since raised beaches of the clays are now observed at altitudes up to 500 feet or more above sea level. The Hudson valley was also lower at that time than it is now. Within the clays are found shells of marine organisms and bones of the whale and walrus. A very complete skeleton of a whale was unearthed at Burlington, Vt., and is now on exhibit in the State Capitol at Montpelier. The Champlain strata extend as far southwest as the eastern end of Lake Ontario.

CHAMP LEVÉ, shän' le-vā'. See ENAMEL.

CHAMPLIN, chămp'lĭn, JAMES TIFT (1811–82). An American educator. He was born in Colchester, Conn., graduated at Brown University in 1834, and entered the Baptist ministry. He was professor of ancient languages in Waterville College (now Colby College) from 1841 to 1857, and was president from 1857 to 1872. He published a number of college textbooks, including a *Text-Book of Intellectual Philosophy* (1860), *First Principles of Ethics* (1861), *Text-Book of Political Economy* (1868), *and Scripture Reading Lessons* (1876).

CHAMPLIN, JOHN DENISON (1834–1915). An American writer. He was born in Stonington, Conn., graduated at Yale in 1856, studied law in Litchfield, Conn., and was admitted to the bar in 1859. In 1862 he began newspaper work, and from 1865 to 1869 was editor of the Litchfield *Sentinel*. He edited *Fox's Mission to Russia* (1873), was one of the corps of editors of Appleton's *American Cyclopædia* (1873–77), and was one of the editors of the *Standard Dictionary* (1892–94). He also edited *Young Folks' Cyclopædia of Common Things* (1879); *Young Folks' Cyclopædia of Persons and Places* (1880); *Young Folks' Cyclopædia of Literature and Art* (1901); *Young Folks' Cyclopædia of Games and Sports*, with Arthur E. Bostwick (New York, 1890); *Young Folks' Cyclopædia of Natural History* (1905); *Cyclopædia of Painters and Paintings*, in collaboration with Perkins (4 vols., 1886–88); *Cyclopædia of Music and Musicians*, in collaboration with Apthorp (3 vols., 1888–90); and *Orations, Addresses, and Speeches of Chauncey M. Depew* (8 vols., 1910). In 1911 appeared his *The Tragedy of Anne Hutchinson* and *The Tragedy of Canonchet*.

CHAMPMESLÉ, shän'mā'lā', MARIE DESMARES (1642–98). A celebrated French actress, born in Rouen, and married in 1666 to Charles Chevillet de Champmeslé, who was an important comedian and playwright of his day. She had already begun her career in the provinces when she came with her husband in 1669 to the Théâtre du Marais in Paris. Her great reputation seems to have started with her acting of Hermione in *Andromaque* at the Hôtel de Bourgogne the following year. Racine was notoriously captivated by her charms, and the public appreciation of her acting was almost as enthusiastic. She and her husband went over in a few years to the Théâtre Grénégaud, and in 1680 at the union of the companies they became members of the new Comédie Française. During her brilliant career "La Champmeslé" created a large number of the famous rôles, among them Bérénice, Ariane, Phèdre, Vénus in *Les amours de Vénus et d'Adonis*, Atalide in *Bajazet*, Monime in *Mithridate*, Iphigénie in *Iphigénie en Aulide*, and the same character in *Oreste et Pylade*. She left the stage, in the vain attempt to restore her health at Auteuil, where she died.

CHAMPNEY, chămp'nĭ, BENJAMIN (1817–1907). An American landscape painter. He was born at New Ipswich, N. H., and studied in Boston and Paris. His best works are paintings of White Mountain scenery and flower pieces. He also painted a panorama of the Rhine, exhibited in Boston and other places, and wrote *Sixty Years' Memories of Art and Artists* (1900). His studio at North Conway was a noted resort, visited by people from all parts of the country.

CHAMPNEY, JAMES WELLS (1843–1903). An American genre and portrait painter. He was born in Boston and first studied wood engraving there, then went to Europe and studied at the Antwerp Academy and under Edouard Frère in Paris. His paintings include landscape and genre subjects, but he is best known for his excellent pastel portraits, among which are those of William Winter, Henry M. Stanley, and Mary Mannering as "Daphne." His etchings and illustrations were also very popular. His wife, ELIZABETH WILLIAMS CHAMPNEY (1850–), is the author of the "Witch Winnie Books," the series of "Vassar Girls Abroad," *Romance of the Feudal Châteaux* (1900), and many other works.

CHAMPNEYS, chămp'nĭz, BASIL (1842–). An English architect and author. He graduated at Trinity College, Cambridge, and studied architecture as a pupil of John Prichard of Llandaff, built the divinity and literary schools at Newnham, the Archæological Museum at Cambridge, Indian Institute (New College), Mansfield College (Oxford), Butler Museum (Harrow), the Quincentenary Buildings (Winchester College), Rylands Library (Manchester), Bedford College, and many churches and schools. The royal medal for 1912 was presented to him by the Institute of British Architects. His publications include *A Quiet Corner of England* (1875) and *Coventry Patmore, Memoirs and Correspondence* (1900).

CHAMPOLLION, shän'pô'lyôn', JEAN FRANÇOIS (1790–1832). A French Egyptologist. He was born Dec. 23, 1790, at Figeac, Department of Lot. He is often called Champollion le Jeune, in distinction from his brother Champollion Figeac, a professor at Grenoble, who educated him. In 1807 he went to Paris to pursue his various Oriental studies, and in 1809 was appointed professor of history at the lyceum of Grenoble. In 1814 he published *L'Egypte sous les Pharaons*, a study of the geography of ancient Egypt. Afterward he essayed the decipherment of the Egyptian hieroglyphics to which the discovery of the Rosetta stone had attracted widespread interest. His brilliant results were first communicated in his *Lettre à Monsieur Dacier* to the public (1822), and were more fully stated in his *Précis du système hiéroglyphique* (1824).

It is now generally recognized that the attempts to ascribe priority in the decipherment of hieroglyphics to Dr. Thomas Young, and even to charge Champollion with plagiarizing Young's discoveries, were entirely unjust. Champollion worked independently, and in any case Young's results published in 1819 were of slight importance as compared with those obtained by Champollion. Champollion was sent by the French government to study the museums of Italy in 1824, and in 1828 to Egypt, where he joined a Tuscan expedition, headed by Rosellini. After his return he became a member of the French Académie des Inscriptions (1830), and in 1832 professor of Egyptology at the Collège de France. His premature death was doubtless due to constant overwork. His genius and his untiring industry are most clearly shown in his posthumous works. His *Grammaire égyptienne* (1836) and his *Dictionnaire hiéroglyphique* (1841) were both unfinished at his death. His *Notices manuscripts* (1844 et seq.), at first in incomplete form, gives a more adequate idea of the results of his Egyptian journey than the more extensive *Monuments de l'Egypte*, published 1835 et seq. Of the numerous books and essays published during his lifetime, the most noteworthy are: *Panthéon égyptien* (1824); *Sur l'écriture hiératique* (1821); *Sur l'écriture démotique* (1824). After Champollion's death Egyptology retrograded temporarily, and much time was wasted in fruitless disputes on the merits of Champollion's system. At present no one doubts the enormous debt of gratitude owed by science to the great decipherer, whose system has been brilliantly confirmed by modern discoveries, although it has been greatly developed and improved in matters of detail. Consult Aimé Champollion, *Les deux Champollion, leur vie et leurs œuvres* (Grenoble, 1888).

CHAMPOLLION, JEAN JACQUES (1778–1867), usually called CHAMPOLLION FIGEAC. A distinguished French archæologist, elder brother of J. F. Champollion, the founder of Egyptology. He was born at Figeac, in the Department of Lot, Oct. 5, 1778. After completing his collegiate studies, he was for a time librarian and afterward professor of Greek at Grenoble. In 1828 he was appointed keeper of manuscripts in the Royal Library in Paris, and 20 years later became librarian at Fontainebleau. He was at the same time professor in the Ecole des Chartes. He died May 9, 1867, in his eighty-ninth year. Champollion first published a number of works on French history and philology. Among them were: *Antiquités de Grenoble* (1807); *Recherches sur les patois ou idiomes de France* (1809); *Nouveaux éclaircissements sur la ville de Cularo, aujourd'hui Grenoble* (1814). Then, at his brother's suggestion, he turned his attention to Egyptian archæology, limiting his studies, however, to the Greek documents bearing upon the subject. His *Annales des Lagides* (1819, with *Supplément*, 1821) was crowned by the Institute, and he published later, utilizing his brother's manuscript collections, *L'Egypte ancienne et moderne* (1840) and *L'écriture démotique égyptienne* (1843). Among his other works are: *Traité élémentaire d'archéologie* (2d ed., 1843); *Histoire des peuples anciens et modernes, l'Asie centrale, l'Inde, et la Chine* (1857); *Monographie du palais de Fontainebleau* (1859–64); *Documents paléographiques relatifs à l'histoire des beaux-arts et des belles-lettres pendant le moyen âge* (1868). Champollion also collaborated actively in editing the manuscripts left by his brother. Consult Aimé Champollion, *Les deux Champollion, leur vie et leurs œuvres* (Grenoble, 1888).

CHAMPS ELYSÉES, shän'zā'lē'zā'. The fashionable promenade of Paris—a magnificent avenue, extending from the Place de la Concorde to the Arc de Triomphe de l'Etoile, about 1⅛ miles. It was laid out in 1616 by Marie de' Medicis. The lower end forms a park, on either side of which are placed the Palais de l'Elysée, built in 1718 for Count d'Evreux, and the two Palais des Beaux-Arts, occupying the site of the old Palais de l'Industrie. The afternoon concourse of carriages is one of the sights of Paris. The lower end of the avenue abounds in cafés chantants and restaurants. Though a pleasure promenade, the shifting of the commercial centre of Paris to the west is slowly driving the residential section away from this avenue.

CHANAK KALESSI, chä-näk' kä'lĕs-sē', or KALE SULTANIE (sometimes called Dardanelles) (Turkish, Pot Castle). The chief town of the Sanjak of Bigha in Asiatic Turkey, situated on the Dardanelles (Map: Turkey in Asia, B 2). It is of considerable strategical importance, and is the seat of the Turkish defenses of the straits and islands of the Mediterranean. It has a well-developed pottery industry and a population of about 10,000. The Trojan War is supposed to have been waged in the surrounding country.

CHANAR, chä-när', or **ESPINAL,** ĕs'spē-näl'. Names applied to the thorny xerophytic (dry region) thickets of Argentina. See THICKET.

CHANCE (OF. *cheance*, from ML. *cadentia*, fall, from Lat. *cadere*, to fall). A word which in its original and strict meaning may be defined as the causelessness of an event. (See CAUSALITY.) But with the growing insight into the universal prevalence of causality, chance in this sense of the term is in most scientific and philosophical circles no longer regarded as possible. The word continues to be used in a different sense, viz., the unknown cause of an event. The cause may be entirely unknown, or unknown only in detail. In either case there is a lack of predictability, and in so far as an event is unpredictable it is said to be due to chance. The only case where chance is still believed in as the absence of causality is the case of volition. (See DETERMINISM; FREE WILL.) The unpredictable event is itself called an accident, sometimes also itself a chance. See PROBABILITY.

CHANCE, JULIE GRINNELL (JULIEN GORDON). An American novelist, born in Paris, France. She was married to Col. S. Van Rensselaer Cruger, and after his death to Wade Chance (in 1908). Under the pen name of "Julien Gordon" she wrote many novels displaying much insight into social conditions in the United States and European countries: *A Wedding and Other Stories; A Diplomat's Diary; Poppæa; A Successful Man; Eat not thy Heart; Mademoiselle Reseda; A Puritan Pagan; Mrs. Clyde* (1901); *The Wage of Character* (1901); *World's People* (1902); and a volume of *Poems* (1905).

CHAN'CEL (OF., from ML. *cancellus*, screen, Lat. *cancelli*, grating, dim. of *cancer*, lattice). The end of the church opposite the entrance, so called from the *cancellus* which in the Roman basilica screened the judicial tribune from the rest of the edifice. Usually in fact, and always in ritual, the east end, the choir end, was called

the chancel because it was divided from the body of the church by a screen or rail which marked the beginning of the part reserved for the clergy. In Roman Catholic churches the screen was usually not high except in monastic churches and Gothic cathedrals, but in Greek and Russian churches it completely shuts off the spectator (see ICONOSTASIS), as it did also in many mediæval English churches. The division was made sometimes so as to include the place for singers in the nave, sometimes it divided off only the altar and what was behind it to the end of the apse. In fact, it was used in England as practically synonymous with choir. A chancel aisle is the aisle or ambulatory of the choir. See APSE, BASILICA; CHOIR; CHURCH; REREDOS.

CHAN'CELLOR (OF. *chanceler*, Fr. *chancelier*, Lat. *cancellarius*, porter, doorkeeper, from *cancelli*, lattice). Under the later Roman emperors the chancellor was an usher or officer whose duty it was to stand at the railing or latticework (*cancelli*) to protect the judicial officer from the crowding of the people and to act as intermediary between him and those having business with the court. Upon the breaking up of the Roman Empire the officer of the crown in both the Eastern Empire and the Roman-German Empire and the kingdoms of the West, whose duty it was as notary or scribe to prepare and seal all important documents, was known as a chancellor. His position was one of great influence, and he became the chief officer of the crown. The office was also adopted by the ecclesiastical court at Rome as an inheritance from the Roman Empire, and the office was in turn created in the several bishopries, each diocese having its chancellor. In France the chancellor was an officer of state of great power and dignity. He was charged with the care of the great seal; he presided over the King's councils, and under him several other officers bearing the name of chancellor were employed in the administration of justice and the preservation of public order. During the Revolution the office was abolished (1790). It was revived by Napoleon I, though deprived of many of its functions. It was continued by the Bourbons, but finally, in 1848, merged with the Ministry of Justice. The chief functionary of the Austrian Empire and of other European states has often been termed "chancellor," and on the establishment of the German Empire Bismarck, as the Prime Minister and chief administrative officer, was made Chancellor of the Empire (Reichskanzler), an office which has been continued in his successors.

In England the chancellor, known as the Lord Chancellor or Lord High Chancellor, is the highest judicial officer of the crown, the law adviser of the government and the Keeper of the Great Seal. The existence of the office in England, as in the other states of Europe, is to be ascribed to the influence of the constitution of the Roman Empire, this influence being exercised chiefly through the medium of the Church. In the early history of the office the chancellor was always an ecclesiastic and the confidential adviser of the sovereign in state affairs. It is for this reason that he has been called the keeper of the King's conscience, and it is to this peculiar method of exercising his judicial functions upon equitable or conscientious, as distinguished from purely legal, principles that the Court of Chancery (q.v.), over which he presided, became of the highest importance in English jurisprudence. The Lord High Chancellor is the highest civil officer of the crown, ranking next after the royal family and the Archbishop of Canterbury. The chancellor is a privy councilor by his office, a member of the cabinet, and prolocutor, or presiding officer in the House of Lords, by prescription. The writs for the convocation of Parliament are issued in his name. Though the form in which his tenure of office is terminated is by the resumption of the Great Seal by the sovereign, the chancellor practically resigns office with the party to which he is attached. He has the appointment of all justices of the peace throughout the kingdom, but this privilege he exercises generally on the recommendation of the Lords Lieutenants of the several counties. But the most important and, as it now seems, somewhat anomalous branch of his patronage arises out of his having been originally an ecclesiastic. Though the last bishop who held the office was John Williams, Archbishop of York, who was Lord Keeper from July 10, 1621, to Nov. 1, 1625, the chancellor still continues to be patron of all the crown livings of the value of £20 per annum, or under, and visitor of all hospitals and colleges of the King's foundation. As representing the paternal character of the sovereign, again, the chancellor is the general guardian of all infants, idiots, and lunatics, and has the supervision of all charitable trusts in the kingdom. The chancellor appoints in general all the judges of the superior courts, except the two Chief Justices, who are nominated by the Prime Minister of the day. All these functions the chancellor performs in addition to his extensive duties as the supreme judge of the Court of Chancery, both as an ordinary court of common law and of record and as an extraordinary court of equity. Much inconvenience had arisen from the accumulation of duties in the single person of this high dignitary, and various expedients had been devised for lessening the evil. Vice chancellors had been appointed, and the duties of the Master of the Rolls had been extended. One of the most important changes effected by the Judiciary Acts (1874–75) was the consolidation of all the vice chancellors' courts into one division, called the "Chancery Division of the High Court" under the presidency of the Lord Chancellor. The salary of the chancellor is £10,000 a year, and he has an annuity of £5000 on his retirement from office. The style of the chancellor, since the union with Scotland, has been Lord High Chancellor of Great Britain; but he has scarcely any jurisdiction in Scotland, and in Ireland there is a separate chancellor, having powers in most respects the same as those of the chancellor of Great Britain. To slay the chancellor is treason under 25 Edw. III, c. 2.

The *Chancellor of the Exchequer* is the Minister of Finance under the British government. He is a member of the cabinet and of the House of Commons. Formerly he was a judge ex officio of the Chancery Division of the Court of Exchequer, but the equity jurisdiction of the Court of Exchequer was transferred to the Court of Chancery by Statute of 5 Vict. V, since which he has had no judicial functions. See CURIA REGIS; EXCHEQUER.

The *Chancellor of the Duchy of Lancaster* is an officer who formerly presided over the courts of law and equity in the Duchy of Lancaster.

He is a member of the cabinet. The office is now a sinecure.

In several of the United States the term "chancellor" has been applied to the chief judicial officer of the Court of Chancery when such court has been maintained as a distinct court from the courts of common law. In several of the States the judges of law courts have been given equity jurisdiction, thus doing away with the separate Court of Chancery. The title has not been used in New York since 1848, when the law courts of that State were given equity jurisdiction. The court and title still exist in Delaware, New Jersey, and some other States. (See CHANCERY; EQUITY.) In Oxford and Cambridge the title "chancellor" is bestowed on the honorary head of the university, usually some person of distinction. He has little or no connection with university administration, which is in the hands of the vice chancellor, chosen from among the heads of the colleges. In the United States chancellor is used in a few instances for president, to designate the head of an educational institution.

In the ecclesiastical use of the term the *chancellor of a cathedral* is a dignified official, usually a canon, who superintends the arrangements for the celebration of the religious services. His office is quite distinct from that of the *chancellor of a diocese*, who is vicar-general to the bishop, and an ecclesiastical judge appointed to assist the bishop in questions of ecclesiastical law and hold his courts for him.

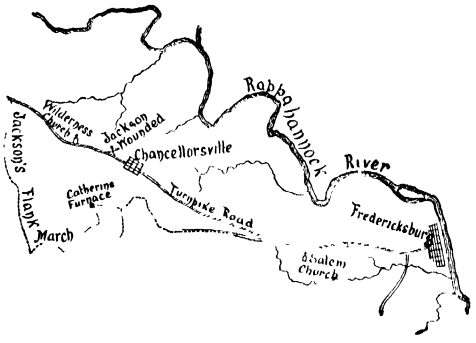
CHANCELLOR, CHARLES WILLIAMS (1833–). An American physician, born in Virginia. He was educated at the University of Virginia and practiced medicine at Alexandria. During the Civil War he was medical director on the staff of General Pickett. In 1868 he was appointed professor of surgery in the Washington College of Maryland, and from 1893 to 1897 was United States Consul at Havre, France. He is the author of: *Charitable Institutions of Maryland* (1875); *Mineral Water and Seaside Resorts* (1883); *Drainage of the Marsh Lands of Maryland* (1884); *Heredity* (1886); *Sewerage of Cities* (1886).

CHANCELLOR, RICHARD (?–1556). An English navigator, who in 1550 was the companion of Roger Bodenham on his voyage to Candia and Chios. In 1553 he was appointed pilot general of the northern expedition under Sir Hugh Willoughby, the purpose of which was primarily to seek a northeast passage to China. During a hurricane off the Lofoden Islands the ships were scattered. The *Edouard Bonaventure*, under Chancellor, alone entered the White Sea, landing near the present site of Archangel. From here Chancellor proceeded to Moscow, where he was well received by the Czar, with whom he succeeded in negotiating a treaty of commerce, and shortly afterward the Muscovy Company was established. Chancellor and his crew were shipwrecked and drowned while returning from a second voyage to Russia in 1556.

CHANCELLOR, WILLIAM ESTABROOK (1867–). An American lecturer and author, born at Dayton, Ohio. He was educated at Amherst College and Harvard Law School, and in 1895–96 was instructor in history at Erasmus Hall High School, Brooklyn, N. Y. He served as superintendent of schools at Bloomfield, N. J., in 1897–1904, at Paterson, N. J., in 1904–06, in the District of Columbia in 1906–08, and then at Norwalk, Conn. He lectured on more than 3000 occasions in 42 States, and at Chicago, Wooster, George Washington, Johns Hopkins, and Northwestern universities. His works include: *Mathematical Series* (10 vols., 1902); *American History* (1903); *Graded City Spellers* (1903); *Evening School Text Books* (5 vols., 1904–11); *Our Schools* (1904); *Washington Word List* (1906); *A Theory of Education* (1907); *Our City Schools* (1908); *Class Teaching and Management* (1910); *Our Presidents and their Office* (1911); *The Life of Silas Wright* (1913).

CHANCELLOR OF THE EXCHEQUER. See EXCHEQUER.

CHAN'CELLORSVILLE, BATTLE OF. One of the most important battles of the Civil War, fought May 2–4, 1863, at Chancellorsville, Va., 11 miles west of Fredericksburg, between the Federal Army of the Potomac, numbering about 130,000, under General Hooker, and the Confederate Army of Northern Virginia, numbering about 60,000, under General Lee. Hooker had superseded Burnside on January 26, and by the middle of April had succeeded in thoroughly reorganizing his army, restoring its *morale*, and



CHANCELLORSVILLE.

preparing it for action. At this time the Federal and Confederate armies lay facing each other across the Rappahannock at Fredericksburg. Hooker resolved to turn the Confederate left flank, first sending nearly all his cavalry, under Stoneman, to destroy Lee's communications with Richmond. The main movement began on April 27, when Hooker sent a portion of the army, under Sedgwick, to distract Lee's attention by crossing below Fredericksburg, while the main force effected a crossing above the town. This movement was successfully executed, and during the night of April 30 the main force was concentrated at Chancellorsville, on Lee's left flank. Lee then turned to face Hooker, and on May 1 the latter timidly drew in his advance and placed himself on the defensive. Early on May 2 Lee ordered Jackson, who had been stationed on his extreme right, with 30,000 men, to make a wide détour, and, swinging round to the extreme right of the Federal position, make an unexpected assault upon the enemy's flank. The direction of this movement was not apparent to the Federals, who began to regard it in the nature of a retreat. About 6 P.M., after a march of some 15 miles, Jackson fell suddenly upon the flank and rear of Howard's corps, which constituted the right flank of the Federal army, and, taking it by surprise, stampeded it. Jackson, while in advance of his troops, was fired upon and mortally wounded by his own men, who mistook his escort for a

detachment of Federals. During the progress of this movement Lee sought to divert the attention of Hooker by a lively demonstration on his front. On the morning of May 3 Lee made a vigorous attack on front and flank, in which Jackson's force, now commanded by Stuart, played a leading part. The brunt of the assault fell upon General Sickles, on the Federal right, and General Slocum, at the centre. Hooker, who was stunned by the impact of a ball on a pillar against which he was leaning, showed indecision; Sickles, who had stayed Stuart's fierce onslaught, fell short of ammunition; some 30,000 fresh troops were not called into action; and at last the Federal line gave way, the army, however, falling back only a short distance to a strong defensive position. Lee was deterred from immediately following up his advantage by the news that his position was threatened on the right by the advance of the Federal force under Sedgwick. At night, on May 2, Hooker had sent word to Sedgwick to advance on Chancellorsville from Fredericksburg. On May 3 Sedgwick attempted to execute the order and capture Fredericksburg and the heights behind it. Lee sent reënforcements which checked his advance, and on the night of May 4–5 Sedgwick recrossed the Rappahannock. Lee then prepared to advance against Hooker on the 5th, but the latter hastily withdrew his army across the river during a heavy storm. In the four days, May 1–4, the Federals had lost about 17,300 in killed, wounded, and missing; the Confederates about 12,465. Lee had clearly outgeneraled Hooker at every point, and had won an important victory with greatly inferior forces; but his success was almost counterbalanced by his loss of Jackson. Emboldened by this victory and the apparent demoralization of the Federal army, he planned his invasion of Pennsylvania, which ended in the battle of Gettysburg (q.v.). Consult: Dodge, *The Campaign of Chancellorsville* (Boston, 1881); Doubleday, *Chancellorsville and Gettysburg* (2d ed., New York, 1882); Johnson and Buel (eds.), *Battles and Leaders of the Civil War*, vol. iii (4 vols., New York, 1887); *Official Records*, vol. xxv (Washington, 1889).

CHANCE MEDLEY (Eng. *chance* + *medley*), and CHAUD MEDLEY, or MELLÉ (OF. *chaude*, hot + *medlée*, fray). French expressions borrowed by the Scottish law. Though sometimes used interchangeably, they are, in reality, distinct in meaning—the former signifying a casual affray, the latter an affray in the heat of blood or passion. Both are, in the United States and in most countries, recognized as pleas in mitigation of the offense of homicide (q.v.). See also DEFENSE; SANCTUARY.

CHAN'CERY (Fr. *chancellerie*, It., ML. *cancelleria*, from *cancellarius*, chancellor, from Lat. *cancelli*, lattice), COURT OF. In English law, the court presided over by the Lord High Chancellor, and until recently the highest court in England, inferior only to Parliament. Originally a chancery was the office of a secretary or chancellor (q.v.), where official documents were put in form, sealed, and dispatched, or filed as records.

The jurisdiction of the Court of Chancery was developed subsequently to the establishment of the English courts of law, and consisted of that portion of the King's judicial prerogative in civil causes which he had not delegated to the courts of law. Whenever, in the early history of the common law, a suitor conceived that he had suffered an injury or wrong for which the courts of law afforded no remedy by means of a common-law writ (q.v.), his only recourse was to petition the crown. These petitions came to be addressed to the chancellor, who, as the chief officer and adviser of the crown and Keeper of the Great Seal, was deemed to be a personal representative of the King and thus endowed with his judicial prerogative. The practice of obtaining relief in this manner gradually took on the character of a judicial proceeding, and the chancellor's office, or chancery, came to be known as the Court of the Chancellor or the Court of Chancery, or, in modern times, as the Court of Equity (q.v.). To this peculiar origin of chancery jurisdiction are due several peculiarities in the manner in which jurisdiction is exercised which are fundamental in equity jurisprudence. Thus, as the chancellor was the personal representative of the King, his authority was personal. It could be exercised at any time, whether in term time or vacation, and at any place in the kingdom. Unlike the judges of the courts of law, he could command an act to be or not to be done. As, by virtue of his office, his commands were the commands of the sovereign, he who refused obedience was guilty of contempt of the King, and his disobedience was punishable by imprisonment; and, as an ecclesiastic, the chancellor could invoke the power of the Church and punish the contempt by excommunication. By reason of these powers of the chancellor, the Court of Chancery became a court acting in personam, as distinguished from courts of law, which acted in rem.

The common-law procedure was founded on the theory that the parties to an action owed no obedience to the court. Thus, if the plaintiff brought an action at law to recover property wrongfully withheld from him by the defendant, or to recover damages for tort or breach of contract, the court could give judgment for the plaintiff, and then by its writ direct the sheriff to seize the property and deliver it to the plaintiff or levy upon the defendant's property and then satisfy the judgment; but if the defendant concealed the property of the plaintiff or his own, or removed it from the jurisdiction, the court of law was powerless to act. On the other hand, the Court of Equity, in a proper case, could direct the defendant to perform his contract, or to turn over property to the plaintiff, or to do any act required by justice or the necessities of the case. It followed, from the difference in the character of the jurisdiction that was exercised by the two courts, that while the relief afforded by the court of law was necessarily remedial, the relief afforded in chancery might be, and frequently was, preventive. Thus the court of law had no power to restrain a defendant from doing an act which might injure the plaintiff in the future, but the chancellor, by reason of his power to command, might issue an injunction directing the defendant to refrain from such an act.

Another important consequence of the difference in kind of jurisdiction exercised by the two courts was the ability of the chancellor to deal with a many-sided controversy. A controversy at law was necessarily two-sided. The law court could only find a verdict and direct a judgment for either the plaintiff or the defendant; but, inasmuch as the chancellor might

require obedience to his decrees on pain of punishment for contempt, it was possible for him, in a single proceeding, to determine and adjust the rights of numerous parties, not only as between plaintiff and defendant, but as between those who, nominally codefendants, actually had some controversy among themselves. As recourse to the chancellor was originally due to the inability of the litigant to obtain relief at law, it became a fundamental principle of the Court of Chancery that it would take jurisdiction of the cause only when it appeared that there was no adequate remedy at law. Moreover, as the chancellor was originally an ecclesiastic and the "keeper of the King's conscience," he was said to exercise his jurisdiction on conscientious or equitable principles, for the purpose of doing justice, without regard to the strict rules of the common law. This gave rise to certain basic equitable principles unknown to the law, which, however, when once established by precedent, were applied by the Court of Equity in much the same manner that courts of law applied legal principles.

Upon these principles chancery, as do our modern courts of equity, afforded relief in cases of fraud (q.v.) and mistake (q.v.). It compelled defendants before it to give discovery (q.v.), administered trusts, etc., all matters of which courts of law took no cognizance. It also obtained an administrative jurisdiction over the affairs of married women, infants, and insane persons, by virtue of the chancellor representing the King in his administrative capacity.

Thus there grew up with the common law a great legal system which, while consistent with and, indeed, supplementary to it, was largely independent of it. Its office was to mitigate the rigor of the rules of the common law and supply its deficiencies, and this it was able to do because of the manner in which it exercised its jurisdiction. The jurisdiction of the Court of Chancery is (*a*) coördinate, (*b*) supplementary, and (*c*) exclusive.

Jurisdiction is said to be coördinate when the litigant has his election to seek relief at law or in chancery. Hence, for breach of contract the plaintiff has the alternative of recovering damages at law; or, if legal damages are inadequate, securing specific performance of the contract by decree of the chancellor.

The jurisdiction of chancery is said to be supplemental when, for the purpose of protecting rights recognized and enforced by courts of law, it confers and enforces new equitable rights; thus the right of the mortgagor to redeem mortgaged property and of the mortgagee to foreclose in equity, and, in a similar manner, the exercise of its jurisdiction over waste (q.v.), are typical examples of the supplemental jurisdiction of chancery. (See MORTGAGE.) The jurisdiction of chancery is exclusive when its powers are exerted in protecting purely equitable rights—i.e., rights which are recognized in chancery, but of which the law takes no cognizance. The most notable example is the jurisdiction exercised in chancery over uses and trusts (q.v.).

Before 1873 the constitution of the Court of Chancery in England consisted of the Lord High Chancellor, the Master of the Rolls, and three vice chancellors. In that year an act was passed by which the Court of Chancery became one division of the High Court of Justice, retaining only its equity jurisdiction, its ordinary jurisdiction being transferred to other divisions of the court. This forms an important part of that "fusion of law and equity" under the Judicature Acts (1873–76), which has so simplified and made orderly the practice of English courts.

In the United States the terms "court of chancery" and "chancery" are used in some States as equivalent to "courts of equity" and "equity." The principles and practice of equity were generally transferred to this country as they existed in England; but in most of the States there are no separate courts of chancery, the same judge sitting, according to the nature of the case, either as a common-law or equity court. A few States, however, instituted courts of chancery under that name; these were Alabama, Delaware, Florida, Mississippi, New Jersey, Tennessee, and Vermont. As early as 1848 the State of New York not only abolished the distinction between courts of equity and common law, but did away with the old forms of practice in both.

Many of the States have followed this reform. By the United States Constitution, Federal courts are especially given jurisdiction in equity as well as in common law, and the distinction between procedure at law and equity has been maintained, though both systems are administered by the same courts. Consult: Kerly, *Historical Sketch of the Equitable Jurisdiction of the Court of Chancery* (Cambridge, Eng., 1890); Gilbert, *History and Practice of the High Court of Chancery* (London, 1758; first Amer. ed., Washington, 1874); Marsh, *History of the Court of Chancery and of the Rise and Development of the Doctrines of Equity* (Toronto, 1890). See EQUITY; EQUITY PLEADING; PRACTICE.

CHANCES, THE. A comedy by John Fletcher, first printed in the folio edition of 1647. It was altered by George Villiers, Duke of Buckingham, in 1682; but "the licentiousness of that nobleman's pen rendering the play improper for representation" at later and more refined periods, it was revised a second time by Garrick in 1773. Its source is Cervantes' novel *La Señora Cornelia*. A musical drama entitled *Don John, or the Two Violettas*, produced in 1821, was based on it.

CHANDA, chŭn'dȧ. The capital of a district of the same name, in the Nagpur division, Central Provinces, British India (Map: India, C 4), lat. 19° 57′ N., long. 78° 58′ E. The town stands on the left bank of the Virâi, near its junction with the Jharpat, 90 miles south of the town of Nagpur. Its walls, built of cut stone and surrounded by a high parapet, are 6 miles round, from 15 to 20 feet high, 10 feet thick, and flanked with rough towers large enough for the heaviest guns. Its archæological remains, temples, regal tombs, and gigantic monolithic figures of the later Gond kings are interesting. Being surrounded by mountains and forests, it is well supplied with water. Outside the walls is a large water tank constructed under Gond rule, and a collection of ancient statuary known as Rayappâ's idols, the largest of which is 26 × 18 × 3 feet. Pop., 1901, 17,803; 1911, 19,866. Chanda is the commercial centre of the district with manufactures of silk, cotton, dyestuffs, slippers, bamboo work, and gold and silver work. It has numerous schools and a mission station. The district contains considerable iron and coal deposits. Area, 10,156 square miles. Pop., 1891, 697,600; 1901, 581,315; 1911, 677,544.

CHANDÂLA, chŭn-dä'lȧ (Skt. *candâla*).

The lowest of the impure classes in Hindu caste. See CASTE.

CHANDELEUR (shăn'de-lōōr') **ISLANDS.** A group of about 15 small islands lying in the Gulf of Mexico from 20 to 30 miles off the east coast of Louisiana, from which mainland they are separated by Chandeleur Sound (Map: Louisiana, G 4). A lighthouse on the north end of the northernmost island is in lat. 30° 2′ N. and long. 88° 52′ W.; it has a fixed white light.

CHANDERNAGAR, or **CHANDERNAGORE,** chŭn'dĕr-nŭg'ĕr (Skt. *candranagara,* city of the moon, from *candra,* moon + *nagara,* city). A city in India with a territory of about 3 square miles, belonging to France, situated on the west bank of the Hugli, 21 miles above Calcutta by rail, in lat. 22° 52′ N. and long. 88° 23′ E. (Map: India, E 4). A former rival to Calcutta in commercial importance, its trade has declined owing to the silting of its river approaches. It is under the French Governor-General of Pondicherry. The population (1901, 26,831) includes a French subgovernor with a small military detachment, and a few Europeans and Eurasians, the great bulk being natives. The settlement dates from 1673. It was taken three times by the English, but was finally restored to France in 1816.

CHAND'LER, CHARLES FREDERICK (1836–). An American chemist, born at Lancaster, Mass. He was educated at the Lawrence Scientific School of Harvard University and at the universities of Göttingen and Berlin. After being director of the chemical department of Union College, Schenectady, N. Y. (1857), he was appointed professor of chemistry in the New York College of Pharmacy (1858). In 1864 he became professor of analytical and applied chemistry in the School of Mines, Columbia University, and in 1876 he was appointed to the chair of chemistry and medical jurisprudence in the College of Physicians and Surgeons. In 1865 he became chemist, and in 1873 president, of the Board of Health of the City of New York. He was president of the American Chemical Society in 1881 and 1889, of the British Society of Chemical Industry in 1899, and of the Chemists' Club in 1899–1900. In association with his brother, Prof. W. H. Chandler, of Lehigh University, he, in 1870, established the monthly publication entitled the *American Chemist* (1870–77). His numerous papers, most of which are published in the above-mentioned journal and in the annual reports of the Health Department of New York, include: *Report on Waters for Locomotives and Boiler Incrustations* (1865); *Chemistry of Gas Lighting* (1876); *Dangerous Kerosene; Lecture on Water* (1871); *Photo-Mechanical Processes* (1890); *Report on Dangerous Cosmetics* (1870); *Report on Petroleum as an Illuminator* (1871); *Report on the Waters of the Hudson River* (1872); *Synopsis of Organic Chemistry* (printed for the class of '65, Union College, Schenectady, 1864); *Manual of Qualitative Analysis* (pamphlet, 1873). Among the numerous reforms introduced during the administration of Professor Chandler were the segregation of slaughterhouses and the passage of the Tenement House Act, providing that the plans of every tenement house must first be submitted to the Board of Health.

CHANDLER, FRANCIS WARD (1844–). An American architect, born in Boston. He worked with Ware and Van Brunt, architects, in 1864–67, and after that studied in Paris for two years. In 1869–70 he was assistant in the architectural department of the Massachusetts Institute of Technology, and in 1871–74 assistant architect in the Treasury Department, Washington. For six years he was in partnership with E. C. Cabot, Boston, in 1888 becoming professor of architecture at the Massachusetts Institute of Technology. Besides editing *Municipal Architecture in Boston* (1898) and writing articles for the *Technology Quarterly,* he is author of *Construction Details* (1892) and *Notes on Limes, Cements, Mortars, and Concretes* (1892).

CHANDLER, SETH CARLO (1846–1913). An American astronomer, born in Boston, Mass. He was long attached to the Harvard Observatory; was awarded the gold medal of the Royal Astronomical Society of London in 1896 for his determination of the laws of the variations of latitude or movements of the earth's pole and his researches on variable stars, of which he has prepared a catalogue. He was elected a member of the National Academy of Sciences in 1888 and is the inventor of the instrument known as the almucantar (q.v.). In 1896 he assumed the editorship of the *Astronomical Journal.*

CHANDLER, WILLIAM EATON (1835–). An American politician. He was born in Concord, N. H., and graduated at the Harvard Law School in 1854. He was Speaker of the New Hampshire Legislature in 1863–64, and was First Assistant Secretary of the Treasury under Secretary McCulloch from 1865 to 1867. He was Secretary of the Navy from 1882 to 1885, and it was during his administration that the building of the modern navy was begun. He was United States Senator from New Hampshire in 1887–1901, when he became president of the Spanish Treaty Claims Commission, and was a member of the New Hampshire Constitutional Convention in 1902.

CHANDLER, ZACHARIAH (1813–79). An American merchant and politician. He was born at Bedford, N. H., was educated in a common school, and in 1833 removed to Detroit, Mich., where he became a wealthy and prosperous dry-goods merchant. He was an active member of the Whig party and in 1851 was elected mayor of the city. In 1852 he was nominated for Governor, but was defeated. He took an active part in the organization of the Republican party, and in 1857 was sent to the United States Senate, where he soon became conspicuous as a radical opponent of all schemes for the extension of slavery. When the Civil War broke out, he was one of the foremost advocates of a vigorous prosecution of hostilities, and urged that 500,000 volunteers instead of 75,000 be called for at the start. He was reëlected to the Senate in 1863 and again in 1869; served as Secretary of the Interior in the cabinet of President Grant from 1875 to 1877; was chairman of the Republican National Committee in 1876, taking an active part in the presidential campaign; and in February, 1879, was again elected to the Senate, where he soon attracted general attention by a virulent attack on Jefferson Davis. He died suddenly in Chicago, whither he had gone to make a political speech. He was a man of great force and of unusual administrative capacity, but excited widespread antagonism by his radicalism in politics and his unscrupulousness. See his *Life* by W. E. Curtis (New York, 1879).

CHANDOGYA, chŭn'dō-jĭ'ä. In Hindu literature, the name of a Brāhmaṇa of the Sāmaveda, in 10 books, of which the eight known in Europe

up to the present day form the important *Chandogya Upanishad*, treating of the values of the sacred syllable Om. It has been translated by Müller in vol. i of the *Sacred Books of the East*.

CHANDOS, chăn'dŏs, Sir John (?–1370). An English soldier. He participated in the siege of Cambrai (1337) and in the battles of Crécy (1346) and of Poitiers (1356). In the last-named engagement he saved the life of the Black Prince and for this was rewarded by being made regent and lieutenant of the English King in France. Having been made Constable of Guienne, he won the victories of Auray (1364) and Navarette in Spain (1369) over Du Guesclin, whom he captured each time. He became Seneschal of Poitiers in 1369, but in the next year was mortally wounded in an engagement near the bridge at Lussac. Chandos was one of the original knights of the Order of the Garter.

CHANDRAGUPTA, chŭn'drà-gōōp'tà. See Sandrocottus.

CHA'NEY, Lucian West (1857–). An American biologist, born at Heuvelton, N. Y. Educated at Carleton College, he spent three years as principal and superintendent of schools in Minnesota, and then returned to Carleton to be instructor in biology in 1882 and professor from 1883 to 1908. In 1907 he became a special agent of the United States Bureau of Labor to investigate dangerous occupations of women and children, and in 1909 was appointed the bureau's expert in industrial hygiene. He also explored Rocky Mountain glaciers and was a delegate to various economic and geographic congresses.

CHAN'FRON, or Chan'frain. See Chamfron.

CHANGARNIER, shän'gär'nyâ', Nicolas Anne Théodule (1793–1877). A French general, born at Autun. He was educated at the military school of Saint-Cyr, entered the army, and took part, in 1823, in the Spanish expedition. In 1830 he went as captain to Algeria, where he distinguished himself and rose to the rank of general of division. After the revolution of 1848 he superseded Cavaignac (q.v.) as Governor of Algeria, but when chosen a member of the National Assembly he returned to Paris in the same year and was appointed commander in chief of the National Guard, and, when Louis Napoleon became President, of the troops in Paris. He was a member of the Assembly and held at the same time his double office in the army, until the coup d'état of December, 1851, when he was exiled. He returned to France in 1859 after the proclamation of general amnesty. On the outbreak of the Franco-German War Changarnier offered his services to the government, but they were rejected by Marshal Lebœuf, the Minister of War. In August, however, the Emperor asked him to join the army of Bazaine. He assisted in the defense of Metz and was employed by Bazaine in the negotiations with Prince Frederick Charles which led to the capitulation of Bazaine's army, on Oct. 27, 1870. He returned to France in 1871 and served in the Assembly until 1873, when he participated in the proceedings which caused the downfall of Thiers. In 1875 he voted against the constitutional law recognizing the Republic, and in the Senate, of which he was made a life member, in the same year, he showed himself an enemy of Republican institutions. He died in Paris, Feb. 14, 1877.

CHANG-CHOW, chăng'chou'. The capital of the Département of Chang-chow, Fu-kien, China, on the Kiu-lung estuary, 35 miles west of Amoy (Map: China, E 7). It is a walled city, inclosed within a circuit of 4½ miles, and has broad granite-paved streets with fine stores. The chief building is a Buddhist temple, dating from the eighth century. A wooden bridge nearly 800 feet long, resting on 25 stone piles, spans the river. The town has manufactures of silk, sugar, crystal, and bricks, and carries on an extensive domestic and export trade in tea and sugar. Pop. (est.), between 900,000 and 1,000,000.

CHANGELING. It was at one time a common superstition that infants were taken from their cradles by fairies, who substituted for them their own weakly and starving elves. The children so left were called *changelings* and were known by their peevishness as well as their backwardness in walking and speaking. As it was supposed that the fairies had no power to change children that had been christened, infants were carefully watched until that ceremony had been performed. This superstition is alluded to by Shakespeare, Spenser, and other poets.

CHANGELING, The. A drama, by Middleton and Rowley, produced in 1623 and published in quarto in 1653. After the Restoration, in 1661, it was successfully revived. It is in great measure founded on an episode in Reynolds's *The Triumphs of God's Revenge*.

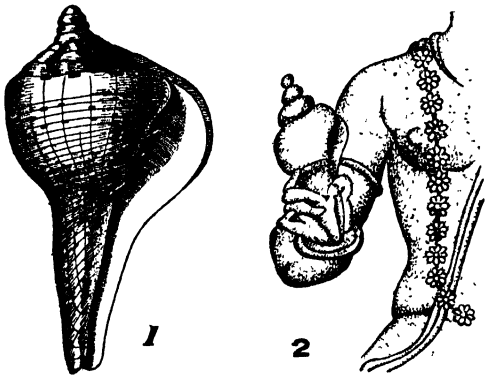
CHANGE-OF-DAY LINE. See International Date Line.

CHANGO, chän'gô. An Indian tribe living in the rainless coast region bordering upon the desert of Atacama, northern Chile; their territory formerly included the region between 22° and 24° S. lat., particularly the country about Cobija. Their language, now extinct, constituted, apparently, a distinct stock. Consult Boman, *Antiquités de la Région Andine*, vol. i, pp. 67–73 (Paris, 1910), and Chamberlain, in *Journ. de la Soc. des Amér. de Paris*, N. S., vol. vii, p. 183 (1910).

CHANGRA. See Goat.

CHANG-SHA, chäng'shä'. Capital of the Chinese Province of Hu-nan, situated on the Sian-kiang, about 350 miles north of Canton (Map: China, D 6). It is surrounded by a wall and has an important silk industry. Pop., 1911 (est.), 250,000.

CHANK SHELL (Hind. *śankh*, from Skt. *śankha*, conch shell). The top-shaped shell of any of several gastropod mollusks of the genus



1. Chank Shell. 2. Arm of Vishnu, with Chank Shell.

Turbinella, specifically *Turbinella pyrum*. They are obtained chiefly by diving in water 12 or 15 feet deep, along the coasts of southern India and Ceylon, the chief fishery being at Tuticorin,

on the Gulf of Manar, where about 325,000 are obtained each winter, and are chiefly sent to Dacca. They are much used as ornaments, often elaborately carved, by Hindu women, the arms and legs being encircled with them; and many of them are buried with the bodies of opulent persons. This esteem among the Hindus is due to the fact that the shell is a sacred emblem of Vishnu, who is usually represented as holding one.

CHAN'LER, WILLIAM ASTOR (1867–). An American politician and traveler, born in Newport, R. I. After extensive foreign tours he undertook, with Chevalier Ludwig von Höhnel, the exploration of the region east and west of Mount Kenia in Africa. They left Zanzibar in September, 1892, and reached the coast again in July, 1893. Their experiences and scientific work on this trip Chanler embodied in his book, *Through Jungle and Desert* (1896). Upon his return to the United States he entered political life and became a member of the New York State Legislature, from the fifth assembly district in 1897, and from the fourteenth in 1899. He served with special commendation from Shafter, general in command, in the battles before Santiago, Cuba (July 1–2, 1898).

CHANNEL. See ENGLISH CHANNEL.

CHANNEL OF A STREAM. The hollow or depression between the banks through which the water flows. A river may have several channels in parts of its course. In such a case the main channel has been defined by judicial authority to be "that bed of the river over which the principal volume of water flows." It may or may not be coincident with the deepest water or the best currents for navigation. See RIPARIAN RIGHTS; RIVER.

CHANNEL, or **CHANNELING** (OF. *chanel*, from Lat. *canalis*, groove, connected with Skt. *khan*, OPers. *kan*, to dig). The name given to any concave grooving of architectural features. Its most common occurrence is on the shafts of classic columns. It is usual to distinguish the shallow channels on a Doric column, which are separated by *arrises* or sharp edges, from the narrower and deeper "flutes" of Ionic and Corinthian columns, which are separated by narrow fillets. The triglyphs of a Doric frieze are decorated by two vertical channels of V-section, and two half-channels or chamfers at the edges. Many Roman and Renaissance cornices have the face or front of the corona adorned with vertical flutes or channelings, and during the late Empire and early Christian periods, sarcophagi were sometimes covered with a decoration of curious S-shaped channels. See COLUMN; ARCHITECTURE; DORIC ORDER; IONIC ORDER.

CHANNEL BASS. A sciænid fish. See REDFISH.

CHAN'NELBILL'. A large Australian cuckoo (*Scythrops novæ-hollandæ*), having a very large and curiously grooved beak, so that it was long considered a species of hornbill. See Plate of CUCKOOS.

CHANNEL CAT. See CATFISH.

CHANNELING MACHINES. See QUARRYING.

CHANNEL ISLANDS (Fr. *l'Archipel de la Manche*, the Channel Archipelago). A group of islands geographically connected with France, but politically attached to the United Kingdom, in the English Channel, to the west of the peninsula of Cotentin. The islands lie 10 to 30 miles distant from the Normandy coast, and 50 to 120 miles south of the English coast (Map: France, N., C 3). They include Jersey, Guernsey, Alderney, and Sark, and a number of islets. Their combined area is about 75 square miles.

Famous for their strategic position, history, antiquities, genial climate, and picturesque and varied scenery, they constitute favorite and fashionable resorts for English, French, and even American invalids and tourists. The small and highly cultivated farmholdings, ranging from 5 to 12 acres, and the good military roads, give the islands the appearance of carefully laid-out pleasure grounds, and gained from Victor Hugo, long a resident, the designation of "gardens of the sea." The principal industry is agriculture. The soil produces good crops; horticulture and floriculture flourish, potatoes are extensively cultivated for exportation, the annual yield in Jersey exceeding 60,000 tons, valued at $1,320,000, while Guernsey supplies London and Paris with enormous quantities of fruit, grown under glass. The chief fertilizer is *vraic*, or seaweed, the regular gathering of which, controlled by legislation, is one of the characteristic insular scenes. A large quantity of kelp is used in the manufacture of iodine, its value to Guernsey being estimated at $150,000 annually. The three larger islands are noted for distinctive breeds of cattle, the purity of each breed being jealously guarded; they are remarkable for their small size, symmetry, color, and beauty, and for the yield and quality of their milk, making dairy farming a profitable industry. Cattle in 1912 numbered 18,853; horses, 3726; swine, 8466. There are important fisheries of turbot, John Dory, conger eels, oysters, lobsters, monster crabs, etc. The quarries of Jersey and Guernsey are extensively worked and export fine granite for building purposes. There is daily communication by steamer with various English and French ports, and an average of 3000 vessels of 200,000 gross tonnage enter and clear the Channel Islands ports annually.

The geology of the islands is particularly interesting in the primary formation of granite rocks; vegetation is rich and varied, and scientists here find a comprehensive field of study in a small compass. The coasts are rocky and dangerous and the tidal currents treacherous; lighthouses stand on the more important headlands and outlying reefs. The population, April 3, 1911, was 96,900. The chief town is St. Helier, on the island of Jersey. Among the farming population the vernacular is old Norman French, which differs in peculiarities of spelling and pronunciation in each island and even in parishes of the same island. English predominates in the town districts, which contain a large proportion of British and many French residents. The islands are self-governed and afford interesting examples of home rule, forming, as Freeman states, "distinct commonwealths." They include the two bailiwicks of Jersey and Guernsey—the latter including Alderney, Sark, Herm, and adjacent isles—each presided over by a "bailiff" or chief magistrate of native extraction appointed by the British crown, and assisted by a "states" or legislative assembly, composed of "jurats" or magistrates, the rectors of the parishes, all life officers, the "constables" or parochial mayors, and a number of "deputies" or representatives elected for a term. Judicial affairs are managed by a royal court, consisting of the bailiff and jurats, who

thus fill the anomalous dual positions of lawmakers and law dispensers. The British government is represented by lieutenant governors, generally army officers of distinction, who are appointed for five years, command the military forces in the islands, have the right of veto and an equal seat with the bailiff in the States Assembly, but no vote. French is the official language of the legislatures and courts, but after long opposition the optional use of English has been allowed. There are also ecclesiastical courts. Taxation is light, living is inexpensive. Military service at fixed periods is compulsory on all male natives and residents.

The laws of the islands are derived from the *Coutumier de Normandie*, the islands having once formed part of the Duchy of Normandy. They are the sole remains of that duchy, attached to the British crown, whence their independence and the humorous local contention that Great Britain is an appanage of the Channel Islands, legal documents referring to the monarch as Duke of Normandy and King of Great Britain and Ireland. The islands originally were joined to the continent; raised beaches and other traces of disruption exist. Cave dwellings and numerous megalithic cromlechs, tumuli, and menhirs prove the habitation of a prehistoric race; a few old Norman chapels remain; the oldest churches, St. Brelade's, Jersey, and St. Sampson's, Guernsey, date from 1111, and earthworks, fortifications, and castles dating from Roman and subsequent periods exist. The Romans occupied the islands during the third and fourth centuries; Cæsarea (Jersey), Cæsar's Isle, and Sarnia (Guernsey) occur in the *Itinerary* of Antoninus. Christianity was introduced by Irish missionaries about 460 A.D., St. Helier being the apostle of Jersey and St. Sampson of Guernsey. The islands were taken by Rollo previous to his invasion of Normandy; the famous *Roman de Rou*, by Wace (q.v.), a native of Jersey, who wrote in the twelfth century, celebrating his deeds.

After the Conquest the islands alternated between Norman and English rule until 1204, when with the loss of Normandy they remained faithful to England and steadfastly resisted many subsequent attempts on the part of France to capture them. In Henry VI's reign the French held part of Jersey for six years. During the Civil War they were the scene of many notable events, Jersey remaining loyal and Episcopal, and Guernsey republican and Presbyterian. During the Revolutionary War in America a French expedition landed in Jersey in 1781, but was defeated with great loss. During the French and American wars, when shipbuilding was an important local industry, the islanders fitted out many privateers, and, in Burke's words, became "one of the naval powers of the world," capturing many rich prizes. The islands are favorite asylums for political refugees. Their numbers have included Charles II, Earl Clarendon, Victor Hugo, and General Boulanger. Consult: Urquhart, *Channel Islands, Norman Law* (London, 1844); Pegot-Ogier, *Histoire des îles de la Manche* (Paris, 1881); Ansted, *The Channel Islands* (3d ed., London, 1893); De Cléry, *Les îles normandes* (Paris, 1898); Boland, *Les îles de la Manche* (Paris, 1904). See ALDERNEY; JERSEY; GUERNSEY; SARK.

CHANNEL TUNNEL. See TUNNELS.

CHAN'NING, EDWARD (1856–). An American historian, born in Dorchester, Mass., and in 1878 graduated at Harvard, where he was instructor in history in 1883, assistant professor in 1887, and professor in 1897. He wrote: *Town and County Government in the English Colonies of North America* (1884); *The United States of America* (1896), in the "Cambridge (Eng.) Historical Series"; *A Student's History of the United States* (1897; rev. ed., 1908); *A Short History of the United States for School Use* (1900), and *History of the United States*, vols. i–iii (1905, 1908, 1912); *The Jeffersonian System, 1801–1811* (1906), in the "American Nation Series." He collaborated with Justin Winsor in vols. ii, vi, and vii of the *Narrative and Critical History of America* (1886–88), with T. W. Higginson in *English History for Americans* (1893), with A. B. Hart in the *Guide to the Study of American History* (1896), and with A. B. Hart and F. J. Turner in a new edition of this work in 1912.

CHANNING, EDWARD TYRREL (1790–1856). An American scholar, the brother of William Ellery Channing. He was educated at Harvard and began the practice of law in Boston, but devoted his attention chiefly to literature. From 1817 to 1819 he edited the *North American Review* and was a regular contributor to it through a large part of his life. He was professor of rhetoric and oratory in Harvard College from 1819 to 1851. A volume of his lectures was published in 1856 with a memoir by R. H. Dana.

CHANNING, WILLIAM ELLERY (1780–1842). An American Unitarian preacher and author. He was born April 7, 1780, in Newport, R. I., entered Harvard at the age of 15, and took his degree in 1798. He taught for two years in Richmond, Va., and then studied divinity. In 1803 he was ordained minister of Federal Street Church in Boston. During the earlier years of his ministry his theological peculiarities had little prominence in his discourses, and in consequence he stood upon friendly terms with his brethren in more orthodox churches. In 1819, however, he preached a sermon at the ordination of the Rev. Jared Sparks, in which he pointed out the inadequacy of the Calvinistic theology then current, and advocated the Unitarian doctrine with so much zeal and ability that he was termed "the apostle of Unitarianism." This involved him in a controversy, a thing which he naturally loathed. To the end of his life he preserved a devoutly Christian heart, shrinking with the delicate instinct of a refined nature from everything cold, one-sided, and dogmatic, whether Unitarian or Trinitarian. As late as 1841 he wrote, "I am little of a Unitarian, have little sympathy with the system of Priestley and Belsham, and stand aloof from all but those who strive and pray for clearer light." In 1822 he visited Europe and made the acquaintance of several English authors, among them Wordsworth and Coleridge, both of whom were strongly impressed in his favor. Coleridge said of him: "He has the love of wisdom and the wisdom of love." In 1823 he published *Remarks on National Literature;* in 1826, *On the Character and Writings of John Milton;* in 1829, *On the Character and Writings of Fénelon;* in 1835, an essay on *Negro Slavery*, strongly opposing it from the moral point of view; and in 1838 an essay on *Self-Culture*. Besides these he wrote a variety of other essays and treatises, all characterized by vigor, eloquence, pure taste, and a lofty tone of moral earnestness. He died, Oct. 2, 1842, at Bennington, Vt. His complete works

have been several times reprinted (e.g., in 1 vol., Boston, 1903). In an age of mental timidity Channing stood forth conspicuous for his intellectual bravery. But more important than his purely theological speculations was the public exercise of a wide influence on his contemporaries in regard to social and philanthropic questions and the organization of charity, in the interest of peace, of temperance, and of education, the ethics of political life, and the question of slavery. In the last-named matter, while never taking the extreme abolition position, he gave much moral support to the movement; and in concert with Emerson and other great intellectual leaders, was a great factor in the strenuous New England life of the middle of the nineteenth century. An interesting memoir of him was published by his nephew, William Henry Channing (3 vols., London, 1848, and reprinted in Boston, 1880). A bronze statue of him by Herbert Adams was unveiled in the Public Garden of Boston in 1903. Consult Chadwick, *W. E. Channing* (Boston, 1903), and Eliot, *Four American Leaders* (Washington, Franklin, Emerson, and Channing) (Boston, 1906).

CHANNING, William Ellery (1818–1901). An American journalist, poet, and essayist, a nephew of the great Unitarian preacher of the same name. He was born in Boston, was educated at Harvard, and was for many years connected with various newspapers and magazines. He published volumes of poems, and in prose: *Youth of the Poet and Painter; Thoreau, the Poet-Naturalist* (1873); *Conversations in Rome between an Artist, a Catholic, and a Critic* (1847)

CHANNING, William Henry (1810–84). An American Unitarian clergyman and author. He was born in Boston, Mass., May 25, 1810, and was a nephew of William Ellery Channing. He graduated at Harvard in 1829, at Cambridge Divinity School in 1833, and was ordained and installed over the Unitarian church in Cincinnati in 1835. After filling several pastorates in the United States, he succeeded (1857) James Martineau as minister of the Hope Street Unitarian Chapel, Liverpool, England. At the commencement of the Rebellion he returned (1862) and took charge of the Unitarian church in Washington, D. C. He was one of the early supporters of the socialistic movement in this country, was editor of the *Present* and the *Harbinger*, and in 1848 presided over a socialistic association in Boston. He was a prolific writer, contributing to the *North American Review*, the *Dial*, the *Christian Examiner*, and other serials. Among his larger works are a translation of Jouffroy's *Ethics* (1840); *Memoir of* [his uncle] *William Ellery Channing* (3 vols., 1848); *Memoir of* [his cousin] *the Rev. James H. Perkins* (1851); *Memoir of Margaret Fuller Ossoli* (in conjunction with Emerson and J. F. Clarke) (1852). He died in London, Dec. 23, 1884. For his life, consult O. B. Frothingham (Boston, 1886).

CHANSON DE ROLAND, shäN'sôN' de rô'läN' (Fr., song of Roland). The best-known and oldest of the extant French *chansons de geste* (q.v.); the type of the class in its best and purest form. It was written demonstrably not later than 1095, possibly as early as 1066. The supposed author's name is given in the text as Turoldus, but he was probably a Norman from Avranches. The poem, which consists of about 4000 lines, deals with the death of Roland at Roncesvalles, and its avenging by Charlemagne. The "Chanson de Roland" lost its vogue in France at an early date, its place being taken by the Breton romances. It never took root in England, but flourished in Germany and in Italy, where Boiardo and Ariosto used its theme. The only ancient manuscript still preserved, dating probably from 1170, is in the Bodleian Library at Oxford. It was first edited in modern times by Michel (Paris, 1837), but more recent scholars have added much to our knowledge. Consult especially the editions by Müller (Göttingen, 1878), Léon Gautier (Tours, 1872 et seq.), and Stengel (Heilbronn, 1878); Seelmann, *Bibliographie des altfranzosischen Rolandsliedes* (Heilbronn, 1888); Gaston Paris, *La poésie du moyen âge* (1885–1906); Gustav Gröber, *Grundriss der romanischen Philologie* (Strassburg, 1904); Léon Gautier, *Les épopées françaises* (1892); P. A. Becker, *Grundriss der altfranzosischen Litteratur* (1907); W. M. Hart, *Ballad and Epic* (1907); C. H. C. Wright, *History of French Literature* (London, 1912); Edmund Stengel, *Das altfranzosische Rolandslied* (1900).

CHANSONS DE GESTE or **GESTES,** zhĕst (Fr., songs of achievement or adventure). The name generally given by scholars to the large and important class of epic poems which sprang into existence in France in the latter part of the tenth century or the beginning of the eleventh. The history of their origin is obscure, and there is no evidence for the existence of preceding ballads out of which they were compiled. The earlier ones are written in decasyllabic iambic lines, arranged in groups (called in French *laisses* or *tirades*) of varying number, connected by assonance or vowel rhyme, the consonants of the final syllables not being the same. This assonance was soon replaced by rhyme, and the 10-syllable line about 1200 by the 12-syllable, or Alexandrine, which is said to take its name from the poem "Alexandre le Grand," by Alexandre de Bernay and Lambert le Tors. Their subject is uniformly French history, treated in a romantic spirit, and generally centring around Charlemagne as the epic hero. As their name implies, they were composed, not to be read, but to be sung or recited. About 110 of them are preserved, averaging 6000 lines apiece. Excepting the oldest and best known, the "Chanson de Roland" (q.v.), and the thirteenth-century "Fierabras," the following, all of the twelfth century, are the best in the judgment of the most competent critics: "Aliscans," "Amis et Amiles," "Antioche," "Berte aux grans Piés," "Garin le Loherain," "Gerard de Roussillon," "Huon de Bordeaux," "Ogier de Danemarche," "Raoul de Cambrai," and the "Voyage de Charlemagne à Constantinople." Consult: Léon Gautier, *Les épopées françaises* (2d ed., 4 vols., Paris, 1878–94); id., in Petit de Julleville, *Histoire de la langue et littérature française* (Paris, 1896–98); Rajna, *Le origini dell' epopea francesca* (Florence, 1884); Saintsbury, *The Flourishing of Romance and the Rise of Allegory* (New York, 1897); G. Paris, *Histoire poétique de Charlemagne* (Paris, 1865). See French Literature; Trouvère; Jongleur.

CHANT (Fr. *chant*, from Lat. *cantus*, from *canere*, to sing). A form of choral music between singing and recitative and especially used for litanies and psalms in the Roman Catholic and Protestant Episcopal services. The chant is the ancient style of church song, certainly as old as Christianity, which seems to have inherited it from the Jewish church. The ancient Persians

chanted or intoned their religious hymns, the Gâthâs (q.v.); St. Paul exhorts believers to sing (to chant) psalms and hymns and spiritual songs; and Pliny the Younger mentions the early morning assembling of Christians to chant hymns to Christ. As rhymed and metrical hymns, now so common, were the product of a later art, so the tunes accompanying them are modern as compared with chants. See AMBROSIAN CHANT; GREGORIAN CHANT; PLAIN CHANT.

CHANT, MRS. LAURA ORMISTON (1848–). An English reformer, composer, and writer, born at Chepstow. She was at various times a teacher, nurse, student of medicine, dress reformer, and crusader against London music halls. Subsequently she became known as a speaker on various social and literary themes, and at the time of the Græco-Turkish War (1897) took bands of nurses to Crete and to the Greek frontier. She visited the United States in 1896, and in many public addresses told what she was doing and purposed to do for the betterment of society in general and women in particular. Her publications include: *Sellcuts' Manager* (novel); *Verona and Other Poems;* several short stories; many pamphlets on temperance, politics, purity, and economic reform; some hymns; and the songs: *Ode to a Skylark* (words by Shelley); *Toddlekin's Songs; Thistledown Action Songs; Galloping Horses Action Songs;* and *The Prodigal* (1907).

CHANTAL, shän'tal', JEANNE FRANÇOISE FRÉMYOT, BARONESS DE (1572–1641). The founder of the Order of the Visitation. She was the daughter of Benigne Frémyot, President of the Parliament of Burgundy, and in her twentieth year married Christophe de Rabutin, Baron de Chantal. While out shooting, he was accidentally killed in 1600. In 1604 his widow met St. Francis de Sales and passed under his spiritual direction. At his suggestion, in 1610, she joined two other pious women in a community, and, when it was confirmed as the Order of the Visitation, made the solemn vows, adding a special one always to choose, in a doubt between two actions, that which tended the more towards perfection. She died at Moulins, was buried at Annecy, and was canonized by Clement XIII in 1767. Her festival is August 21. See VISITATION, SISTERS OF.

CHANT DU DÉPART, shän' dụ dâ'pär', LE (Fr., song of departure). A song of the French Revolution with words by Marie Joseph Blaise Chénier, music by Méhul. It was composed for the fête on the fifth anniversary, July 14, 1794, of the taking of the Bastille. This was the only French national air written during the Reign of Terror, and when sung it created as great an effect as the Marseillaise (q.v.).

CHANTECLER, shän't'-klâr'. A fantastic play by Edmond Rostrand, produced in Paris in 1910. Under the guise of a farmyard scene, it is a bitter satire on modern society. Chantecler, the cock who imagines he rouses the sun, typifies man, the earnest idealist, beguiled by the Pheasant, the fascinating woman, and scorned and persecuted by the other animals, who represent the malicious and selfish elements of society. See CHANTICLEER.

CHANTELOUP, COUNT DE. See CHAPTAL, JEAN ANTOINE.

CHANTEPIE DE LA SAUSSAYE, shän't'-pē' de lå sō'sâ'. See LA SAUSSAYE.

CHANTERELLE, shän't'-rĕl'. See MUSHROOM.

CHAN'TICLEER (OF. *Chantecler,* name of the cock in the Renart epic, from *chanter,* Lat. *cantare,* to sing + *cler,* Lat. *clarus,* clear). An imaginative name for a cock. It occurs both in Old French and Middle English. The cock in the mediæval version of Æsop, *Reynard the Fox* (q.v.), goes by this name, as does also the barnyard hero of Chaucer's *Nun's Priest's Tale,* who "had in his governance seven hennes," one of which "was cleped faire Damoselle Pertelote."

CHANTILLY, shän't'yē'. A town of France in the Department of Oise, about 23 miles north-northeast of Paris (Map: France, N., H 3). Its environs are very picturesque, and the place derives additional interest from its two châteaux surrounded by a magnificent park, both of which belonged to the Condé family from 1632 to 1830. The smaller of the two châteaux is of more recent construction and is regarded as one of the finest specimens of French Renaissance. The older and larger château under Louis II, Prince of Condé, was made famous by the presence of the most brilliant men of its time, La Fontaine, Racine, Molière, La Bruyère, and Boileau, and with its splendid art collections is now, through the gift of the Duc d'Aumale, who built it in 1830, in the possession of the Institut de France. The forest of Chantilly, 5000 acres, is near by. Chantilly lace was once a byword, but the manufactures have fallen off. Chantilly is also a horse-racing centre, with a fine course, and noted for the three annual race meetings held here. Pop. (commune), 1901, 4791; 1911, 5556. Consult "Le Château de Chantilly," in *Revue de l'art ancien et moderne,* vol. iii (Paris, 1898).

CHANTILLY, shăn-til'ĭ. A post village in Fairfax Co., Va., 20 miles west of Washington, where, during a furious thunderstorm on Sept. 1, 1862, after the second battle of Bull Run (q.v.), an indecisive engagement occurred between a part of Pope's army under Generals Hooker, Reno, and Kearny, and two divisions of Lee's army under General Jackson. On the following day the Federal troops were withdrawn to the fortifications about Washington. Each side lost heavily, and among the Federal dead were Generals Isaac I. Stevens and Philip Kearny.

CHANTREY, chăn'trĭ, SIR FRANCIS LEGATT (1781–1842). An English sculptor. He was born at Norton, Derbyshire, April 7, 1781, where he first studied art. He began as a portrait painter, but in 1804 removed to London and, after studying modeling at the Royal Academy, rapidly gained great popularity through his portrait busts. In 1818 he was elected to the Royal Academy for his bust of Benjamin West, and in 1819 to the academies of Florence and Rome. In 1830 he was appointed court sculptor and in 1835 he was knighted. Chantrey was a typical representative of the academic classical school, and was greatly overestimated by his contemporaries. In his portrait busts he seized the most characteristic and pleasing expression of his sitter, and his statues are not without a certain dignity, though somewhat tame. His children are full of grace and tender sentiment. His chief claim to fame, however, is the "Chantrey bequest," a fund of 150,000 pounds which he made to the Royal Academy "for the purchase of British works of art." Among his important works are the

colossal busts of Howe, Duncan, St. Vincent, and Nelson for the Seaman's Hospital, Greenwich; portrait busts of Pitt (Trinity House, London), Scott, Wordsworth, James Watt, and others; the charming tomb of the two children of the Rev. W. Robinson in Lichfield Cathedral; the monuments of Watt, Canning, and Sir John Malcolm in Westminster Abbey; the statues of George III in the London Guildhall and the younger Pitt in Hanover Square; and the equestrian statues of George IV in Trafalgar Square and Wellington before the Royal Exchange. Consult the biographies by Jones (London, 1849) and Raymond (London, 1904).

CHANTRY (OF. *chanterie*, ML. *cantaria*, chantry, from Lat. *cantare*, frequentative of *canere*, to sing). A foundation to provide masses for the repose of the soul of the patron or his friends, or the chapel or altar in a church where such service was performed. Legislation against chantries began under Henry VIII in 1545, when they were dissolved by law and the property given to the King; but, the law being inoperative, another Act was passed under Edward VI in 1547, which had the desired effect, and the King entered into possession of the funds, which amounted to a large sum, as at the time there were 1000 such foundations in England, with certain very carefully ordained exceptions. The text of this important Act is found in Henry Gee's *Documents Illustrative of the History of the English Church*, pp. 328–357 (London, 1896). Private chapels erected with such bequests or gifts are numerous in England, having served, since the Act of 1547, as family chapels for attendance at the regular worship. Some of those of the fifteenth century are highly ornate.

CHANUTE, chà-nōōt'. A city in Neosho Co., Kans., 126 miles south-southwest of Kansas City, Mo., on the Atchison, Topeka, and Santa Fe, and the Missouri, Kansas, and Texas railroads (Map: Kansas, A 4). The extensive repair shops of the former railroad are situated here, and there are a number of manufacturing plants of importance, all operated by natural gas, and including glassworks, brick and cement plants, smelters, drilling-tool works, flour mills, and oil refineries. An extensive oil and gas district surrounds the city, nearly 2000 oil and gas wells having been drilled. The city owns and operates its gas and electric-light plants and water works. Settled in 1872, Chanute was incorporated in 1873, and adopted the commission form of government in 1912. Pop., 1900, 4208; 1910, 9272.

CHANZY, shäN'zē', ANTOINE EUGÈNE ALFRED (1823–83). A French soldier, born at Nouart (Ardennes). He studied at the military school of Saint-Cyr, received a commission in the Zouaves, served in Algeria, and rose to the rank of major. He fought in the Lombardy campaign of 1859 and participated in the Syrian expedition of 1860–61. Commissioned general of brigade, he remained in Algeria until the outbreak of the Franco-Prussian War. Suspecting him of contributing to the press, the government refused his request for a brigade command, but in October he obtained from the Government of National Defense the command of a division, and soon after of the Sixteenth Corps of the Army of the Loire. In December he became commander in chief of the Second Army of the Loire (known also as the Army of the West), and distinguished himself in the stubborn retreat from Beaugency to Laval. Upon the conclusion of the armistice he was elected to the National Assembly, and in 1872 was appointed commander of the Seventh Army Corps. From 1873 to 1879 he was Governor of Algeria, and in 1875 was elected a life senator. In 1879 he received a third of the total vote at the presidential election and in 1880–81 was Ambassador at St. Petersburg. He was probably the most prominent figure in the French resistance to German invasion. He published *La deuxième armée de la Loire* (1871). Consult the biographies by Chuquet (Paris, 1884) and Villefranche (Paris, 1890).

CHAO-CHAU, chou'chou'. A town in the Province of Kwang-tung, China, 15 miles north of the treaty port of Swatow (Map: China, E 7). Pop., 1898 (est.), 200,000.

CHAOS, kā'ŏs (Lat., from Gk. *χάος, chaos*, abyss, from *χαίνειν, chainein*, to yawn, *χάσκειν, chaskein*, to gape). In the ancient cosmogonies, the original infinite space, which was filled with clouds and darkness, from which sprang all things that exist. It gave birth to Erebus and Night, and, as a cosmic form, was the mother of Eros. In the later poets and philosophers the word *chaos* was applied to the confused, shapeless mass out of which the universe was formed into a *cosmos*, or harmonious order. *Chaos* was sometimes used also with reference to the universe as a whole, or to the space between heaven and earth, or to the lower world.

CHAPACU'RAN. An important South American Indian linguistic stock, massed chiefly on the rivers Mamoré, Machupo, Baures, Guaporé, and Blanco in northeast Bolivia, and including the following: Chapacura (or Tapacura; also called Huachi), Quitemoca, Pawumwa, Napeca, and Iten—possibly also, according to De Créqui-Monfort and Rivet, the Rocorona and the Mure. The relationship of the Pawumwa and Iten to Chapacura was simultaneously determined by Rivet and Chamberlain in 1912. Consult Chamberlain, "The Pawumwa Indians," in *American Anthropologist*, N. S., vol. xiv, pp. 632–635 (1914), and De Créqui-Monfort and Rivet, "La famille linguistique Capacura," in the *Journal de la Société des Amér. de Paris*, N. S., vol. x, pp. 119–171 (1913).

CHAPAIS, shà'pâ', JOSEPH AMABLE THOMAS (1858–). A Canadian legislator and writer. He was born at St. Denis de la Bouteillerie, P. Q., and was educated at Ste. Anne's College and at Laval University, where he graduated in 1879. In the same year he was called to the bar. In 1879–84 he was private secretary to the Lieutenant Governor of Quebec. He edited *Le Courier du Canada* (city of Quebec) during 1884–1901. In 1892 he was appointed a member of the Legislative Council, of which he became Speaker in 1895. In 1893 he was a member without portfolio of the cabinet of Louis Olivier Taillon (q.v.) and was Minister of Colonization and Mines in 1897, in which year he retired from office and was appointed professor of history in Laval University. In 1902 he was made a chevalier of the Legion of Honor. He published: *Les congregations enseignantes et le brevet de capacité* (1893); *Discours et conférences* (1898); *Le serment du roi* (1901); *Jean Talon, intendant de la Nouvelle France* (1904); *Mélanges de polémique et d'études religieuses, politiques et littéraires* (1905); *Le Marquis de Montcalm, 1712–1759* (1911).

CHAPALA (chà-pä'là) **LAKE.** The largest

lake in Mexico, situated in the State of Jalisco, in lat. 20° 15′ N. and long. 103° W. (Map: Mexico, G 7). It lies at an altitude of about 6000 feet and covers an area of about 1400 square miles. Its chief tributary stream is the Río Lerma, which enters from the east, and its outlet is the Río Santiago, which leaves the lake on the north side, a few miles west of the mouth of the Río Lerma. The lake contains a number of islands. Few towns are found on its shores.

CHAPARRAL, chă′pȧ-răl′ (Sp. *chaparra,* live oak, probably from Basque *achaparra,* from *aitza,* rock + *abarra,* evergreen oak). A thorny xerophytic (dry-ground) type of thicket, especially characteristic of Texas, Arizona, and the Mexicos. See THICKET.

CHAPARRAL COCK. See ROAD RUNNER.

CHAPBOOKS (Eng. *chap,* AS. *cēap,* bargain, Eng. *cheap,* Ger. *Kauf,* trade, Lat. *caupo,* innkeeper + books). The name given to a variety of old and scarce tracts or small books usually of a homely kind, which at one time formed the only popular literature. In the trade of the bookseller they are distinguishable from the ordinary products of the press by their inferior paper and typography, and are reputed to have been sold by chapmen, or peddlers; hence their designation. The older chapbooks issued in the early part of the seventeenth century are printed in black letter and are in the form of small volumes. Those of a later date are in the type now in use, but are equally plain in appearance. Of either variety, they were mostly printed in London, many being without dates. They were of a miscellaneous kind, including theological tracts, lives of heroes, martyrs, and wonderful personages, interpretations of dreams, fortune telling, prognostications of the weather, stories of giants, ghosts, hobgoblins, and witches, histories in verse, and songs and ballads. An inferior class of tracts succeeded these books for the common people and are best known as *penny chapbooks.* For the most part they consisted of a single sheet, duodecimo, or 24 pages. Besides the title, the first page usually contained a coarse woodcut embellishment. The paper was of the coarsest kind adapted for printing, and the price, as the name imports, was a penny each. The subjects, besides being of a similar nature to the above, included stories of roguery and broad humor. These penny chapbooks were issued by an obscure class of publishers in London and several English provincial towns, particularly Newcastle-on-Tyne. They were also issued from various presses in Edinburgh, Glasgow, Falkirk, and Paisley. After 1800 the chapbooks rapidly declined in popularity, their place being taken by Hannah More's *Repository Tracts,* the *Penny Magazine,* and other cheap publications. Collections of the older chapbooks are now found only in the libraries of bibliophiles, by whom they have been picked up at extravagant prices from dealers in secondhand books. Consult: *Notices of Fugitive Tracts and Chap-Books,* Percy Society, vol. xxix (London, 1851), *Popular English Histories,* Percy Society, vol. xxiii (London, 1848), both edited by Halliwell; Fraser, *Humorous Chap-Books of Scotland* (1873); and Ashton, *A History of the Chap-Books of the Eighteenth Century* (London, 1882). Other countries have their chapbooks. For France, consult Nisard, *Histoire des livres populaires* (Paris, 1854); for Germany, Simrock, *Deutsche Volksbücher* (13 vols., Berlin, 1839–67; new ed., 1887). See also Faxon, "Ephemeral Bibelots," in *Bulletin of Bibliographical Pamphlets* (Boston, 1903); and "Catalogue of English and American Chap-Books," in *Bibliographical Contributions,* No. 56 (Cambridge, 1905).

CHAPEL (OF. *chapele, capele,* from ML. *capella,* chapel, sanctuary for relics, probably referring to the covering of the altar during mass, from *capellus,* dim. of *capa, cappa,* hood, mantle, of uncertain origin, probably not connected either with Lat. *capere,* to take, or *caput,* head). During the Middle Ages the term grew to signify a small building or room for worship, either detached, annexed to, or an integral part of, a larger structure, and not possessing the full privileges and characteristics of a church. Ordinarily mass could be said in chapels only on certain dates, especially on their saints' days; otherwise they were mainly oratories. Baptism could never be administered in them, nor cemeteries attached to them. The extent of their privileges depended on the pleasure of the local bishop. Episcopal palaces had their chapels; one of the earliest was that at Ravenna (fifth century). Civil rulers also had chapels in their palaces (palatine chapels). The Byzantine Duke of Rome had his in the old palace of the Cæsars. That of the doges of Venice was St. Mark's. Charlemagne had his largest one at Aix-la-Chapelle, in the present cathedral; that of the Saxon emperors was at Goslar; the Sainte-Chapelle at Paris was the palatine chapel of St. Louis and his successors; another was built at the Château of St. Germain. (See SAINTE-CHAPELLE.) The feudal nobility regarded a chapel as indispensable in every great castle, as at the Wartburg in Germany, Coucy in France, and later at the châteaux of the dukes of Berry and Burgundy, at Pierrefonds, Urbino, and elsewhere.

In the great communal palaces of mediæval republics there were extremely artistic chapels, as at Nuremberg, Siena, Perugia, and Florence. The great associations, such as the Knights Templars (Tortosa), Knights of St. John (Krak des Chevaliers)—both of these in Syria—the Prussian Knights of the Cross (Schloss Marienburg), had large chapels to hold all the members of the orders. A beautiful modern reproduction of such feudal mediæval chapels is at Neuschwanstein, in the Bavarian highlands, built for King Ludwig II. Other corporations, such as universities and guilds, either had separate structures or chapels in their larger buildings, e.g., that of King's College at Cambridge.

To another class belong chapels connected with churches. Before the eighth century it was rare for chapels or oratories to form an integral part of any church, or for any altar to be erected except in the main apse and later in each of the two side apses. But after this date, with the multiplication of relics and the increased fervor of the worship of saints, altars were multiplied in chapels which were at first excrescences from, but soon became a part of the plan of, the church itself. The richness of the choirs of Romanesque and Gothic churches is due to the symmetrical projection of radiating chapels. Often the central chapel, or Lady Chapel, dedicated to the Virgin Mary, was longer than the rest. (See LADY CHAPEL.) Sometimes a continuous line of chapels opened out of the side aisles, as in Notre Dame in Paris (twelfth century) and a multitude of later churches. The cathedral of Albi has no side

aisles, but a very wide nave flanked by deep chapels on either side. In this way it was possible to pay special separate devotion to each saint whose relics were preserved in any church and to allow wealthy families to build separate chapels for their patron saints. These private chapels were used as private oratories for the donors' families and as burial places for their members and were decorated with paintings and sculptures at their expense. Another class is composed of the numerous small places of prayer and worship scattered over the country and not connected with any church; such as chapels of stations of the cross, votive chapels on the site of some miracle, and wayside shrines.

The term is also applied, at least in the United States, to places of worship, even of large size, erected to serve various subdivisions of a great parish. Thus Trinity Church in New York maintains a number of large churches as its chapels ("chapels of ease"), as St. Paul's, St. John's, and St. Agnes. It was also used to designate places of worship erected by Dissenters in England, the term "church" being restricted by usage to the buildings of the Establishment. Modern universities have their chapels for faculty and students, such as Appleton Chapel at Harvard, the Battell Chapel at Yale, the Marquand Chapel at Princeton, St. Paul's at Columbia University, and many others, in imitation of the magnificent chapels possessed by each college at Oxford and Cambridge. There are also special classes of chantry, domestic, memorial, mortuary, parochial, and proprietary chapels. Consult: Martin, *Manual of Ecclesiastical Architecture* (Cincinnati, 1897); Gilbert Scott, *Mediæval Architecture* (London, 1879); Bond, *Westminster Abbey* (London, 1909); Viollet-le-Duc, *Dictionnaire raisonné de l'architecture française*, article "Chapelle."

CHAPELAIN, shà'plăn', JEAN (1595–1674). A French poet and man of letters, born in Paris. He was one of the first and most influential members of the Academy. His scholarly instincts prompted him to pursue classical studies. He was for many years tutor of the sons of Grand Provost de la Trousse. He wrote a preface for Marini's notorious *Adone*, then translated the *Guzman de Alfarache* of Aleman, and by four inferior odes won from Richelieu a pension and a place in the new Academy. Here he helped Richelieu with his dramas, planned the Academy's *Grammar* and *Dictionary*, and edited its observations, made to order, on Corneille's *Cid*. In 1656 he published half of a long-heralded epic on Joan of Arc, *La pucelle d'Orléans*. His literary reputation now collapsed under a shower of epigrams from Boileau, Furetière, and Montdor. The manuscript of the latter half of the epic remains still unpublished in the National Library. Yet when, in 1662, Chapelain was asked by Colbert to draw up a memorial to guide the King in pensioning literary men, he showed himself learned, just, and generous. He continued a favorite of the court; but though in his earlier years an excellent and amiable man, in old age he is said to have become miserly; but the statements of Ménage and Tallemant des Réaux to this effect should perhaps not be accepted as final. His *Lettres*, edited in part by T. de Larroque (2 vols., Paris, 1880–82), are of great interest, as also his *Lettres inédites* (ed. by L. G. Pellissier, 1894). Consult: Julien Duchesne, *Les poèmes épiques du XVII^e siècle* (1780); A. Fabre, *Les ennemis de Chapelain* (1888); E. de Molènes, *La pucelle, par Jean Chapelain* (Paris, 1891); Fabre, *Chapelain et nos deux premières Académies* (Paris, 1890); Mühlan, *Jean Chapelain: Eine biographisch-kritische Studie* (Leipzig, 1893); Searles, *The Library of Jean Chapelain* (Chicago, 1910); George Saintsbury, *History of Criticism*, vol. ii (1911).

CHAP'EL HILL. A town in Orange Co., N. C., 28 miles (direct) west by north of Raleigh; on the Southern Railroad (Map: North Carolina, C 2). It is the seat of the University of North Carolina (q.v.) and has a Carnegie library. The lumber interests are extensive, and there are cotton and knitting mills and a woodworking plant. It was incorporated in 1851 and is governed by a mayor and a council. Pop., 1900, 1099; 1910, 1149.

CHAPELLE, shà-pĕl', PLACIDE LOUIS (1842–1905). An American prelate, born in the diocese of Mende, France. He studied theology and philosophy at St. Mary's College, Baltimore, Md., was an instructor in St. Charles's College in 1863–65, and was ordained priest in 1865. In 1870 he became assistant pastor of St. John's Church, Baltimore, of which he was later pastor, and in 1882 pastor of St. Matthew's, Washington, D. C. He was in 1891 appointed Coadjutor Bishop to Archbishop Salpointe, of Santa Fe, whom in 1894 he succeeded. In 1897 he was appointed Archbishop of New Orleans, in 1898 apostolic delegate to Cuba and Porto Rico, and in 1899 apostolic delegate also to the Philippine Islands. Upon his return Archbishop Chapelle confined his attention to the affairs of his church in Cuba, Porto Rico, and Louisiana, especially the last. He died at New Orleans of yellow fever.

CHAPELLE ARDENTE, shà'pĕl' är'dänt' (Fr., glowing chapel). A room or mortuary chapel wherein the dead body of a person of high rank, whether ecclesiastical or civil, is laid. The hangings are in black, and burning candles illuminate the scene until the final removal for burial. The custom is of great antiquity in the Catholic church. See CATAFALQUE.

CHAPEL ROYAL (Fr. *chapelle royale*). In the Church of England a chapel royal is composed of two deans (a dean and a subdean), 36 royal chaplains, 10 priests, and a lay choir, styled "gentlemen of the chapel," a clerk and several deputy clerks of the closet, and an organist. The services are performed in London in the small oratory in St. James's Palace. In Scotland the appointments to the chapel royal are purely honorary, involving no services and carrying with them no compensation, though formerly it was attached to the palace at Holyrood and corresponded with the similar establishment in England.

CHAPIN, ANNA ALICE (1880–). An American author, born in New York City. She received a private education and studied music under Harry Roe Shelley. She began writing at an early age; her first book, *A Story of Rhinegold*, was published in 1897, when she was but 17 years old. This was followed by *Wonder Tales from Wagner* (1898); *Wotan, Siegfried, and Brunnhilde* (1898); *Masters of Music* (1901); *Discords* (1905); *The Heart of Music* (1906); *Königskinder* (1911); *The Nowadays Fairy Book* (1911); *The Topsy Turvy Fairy* (1913); *The Eagle's Mate* (1914). She also wrote many short stories for magazines, and with Robert Peyton Carter, whom she married in

1906, wrote a play called *The Deserters*, which was produced in New York in 1910.

CHA'PIN, EDWIN HUBBELL (1814–80). An American Universalist clergyman. He was born in Washington Co., N. Y., and in 1837 began preaching in Richmond, Va., to a congregation of Unitarians and Universalists. In 1846 he went to Massachusetts, and in 1848 to New York, where he became pastor of the Fourth Universalist Church, which later became the church of the Divine Paternity, and remained until his death. Before the Civil War he was a conspicuous opponent of negro slavery. In 1872 he succeeded Dr. Emerson as editor of the *Christian Leader*. Besides his regular sermons, he delivered many lectures and published several volumes, including *Duties of Young Men* (1840; 9th ed., 1856); *Duties of Young Women* (8th ed., 1856); *Characters in the Gospels* (1852); *Discourses on the Lord's Prayer* (1850); *The Crown of Thorns* (1860); *Discourses on the Beatitudes* (1853); *Moral Aspects of City Life* (1853); *True Manliness* (1854); *God's Requirements* (1881). Consult Ellis, *Life of E. H. Chapin* (1883).

CHAPIN, HENRY EDGERTON (1859–). An American biologist, born at Wilbraham, Mass. He was educated at Massachusetts Agricultural College and Boston University. After teaching in secondary schools and engaging in agricultural journalism he was an instructor in the Pennsylvania State Normal School from 1888 to 1890, and professor of biology in Ohio University from 1891 to 1900. In the latter year he became instructor in biology and physiography in a New York high school. Besides his scientific monographs he is joint author of *Chapin's and Rettger's Elementary Zoology and Guide* (2d ed., 1896).

CHAPLAIN (AS. *capellane*, OF., Fr. *chapelain*, ML. *capellanus*, chaplain, from *capella*, chapel). Originally the title of the ecclesiastic who accompanied an army and carried the relics of the patron saint. (See CHAPEL.) It has now come to signify a clergyman not having charge of a parish, but employed to officiate at court, in the household of a nobleman, or in an army, garrison, ship, etc. Thirty-six clergymen of the Church of England hold office as chaplains of the sovereign. Six clergymen of the Church of Scotland have a similar title in Scotland; but their only duty is to conduct prayer at the elections of Scotch representative peers. A statute of Henry VIII limits the right of nominating private chaplains in England; thus, an archbishop may have eight, a duke six, a baron three; and chaplains so appointed have certain privileges and may hold two benefices with cure of souls.

CHAPLAIN. A military clergyman, having the rank and status of a noncombatant officer. In the United States army chaplains are appointed by the President and assigned or transferred by the Secretary of War. Usually they are attached to the various army posts of the departments, under the department commander, who is authorized to recommend to the Secretary of War such transfer of the chaplains in his command as may be deemed for the best interests of the service. By Acts of Congress, approved Feb. 2, 1901, April 21, 1904, June 12, 1906, and Jan. 25, 1907, it is provided that the establishment of chaplains shall consist of 67 men, 15 of whom may be majors; those having less than seven years' service, first lieutenants; and the remainder captains; apportioned as follows: one to each regiment of cavalry, infantry, field artillery, to the coast artillery, and one to the Corps of Engineers. They are chosen from all religious denominations and must not have passed the age of 40 on date of appointment. Chaplains are required to render to the adjutant general of the army monthly reports of duties performed, and keep a record of all marriage, baptismal, and funeral services performed by them. In time of war or on active service chaplains are assigned to the various units of command. The instruction of the enlisted men in the common English branches of education is made by law one of the duties of chaplains.

In the United States navy there are 24 chaplains who perform religious duties on board naval vessels; 4 with the rank of captain, 7 with the rank of commander, 5 with rank of lieutenant commander, 1 with rank of lieutenant, 7 with rank of lieutenant (junior grade). In 1913 the Secretary of the Navy recommended that the number be increased, as well as their duties and responsibilities, and that the battleships and shore stations be provided with Y. M. C. A. or welfare secretaries to assist in the religious and educational as well as general welfare work among the enlisted force.

The pay of army chaplains is that pertaining to their grade: $2000 per annum for a first lieutenant, $2400 for a captain, $3000 for a major, with a 10 per cent increase for each 5 years' service, not to exceed 40 per cent in all, or $4000 for a major.

The navy chaplain receives the corresponding pay of his relative army rank, except that, under the Act of May 13, 1908, his pay and allowances shall not exceed those of a lieutenant commander corresponding to the grade of major in the army.

Chaplains are a part of the establishment of all European armies, attendance at the regulation religious services conducted by them being compulsory for all officers and men, except in the French army and navy.

In the British army there are two classes of chaplains, permanent and temporary. In the permanent class are 100 chaplains, all of whom hold permanent commissions as noncombatant officers. The senior, with the rank of major general, is known as the chaplain general. He has charge of the Anglican chaplains only, who form a majority of the corps. The subordinate officers have the rank of colonel, lieutenant colonel, major, or captain. Roman Catholic and Presbyterian chaplains are detailed for duty with regiments in which the majority of the enlisted men profess the corresponding faith. The chaplains' corps is administered by the War Office. Their duties include holding divine service, officiating at funerals, visiting the sick and wounded, and performing the duties and functions of a parish priest at military stations. In war they accompany their regiments. Temporary or special chaplains, known as acting chaplains for temporary service, may be appointed under the Army Chaplain Act of 1868 for special duty wherever needed. The territorial forces were given a chaplains' department in 1909. For India there is provided a special service.

In the British navy the larger ships are each provided with an Anglican chaplain, who must not be over 35 years of age at date of entering

the service and is retired at 60. Pay varies from £129 to £401. Those performing additional duty as instructors receive compensating allowances. The service is administered by its head, the chaplain of the fleet, with the pay of £1000, the same as the chaplain general of the army.

In the French army the office of chaplain was abolished on the separation of church and state. In all other armies the office is officially recognized. The Austrian army, recruited from different nationalities, contains Roman Catholic, Jewish, Greek church, and Mohammedan chaplains. The several states of the German Empire have different systems. In Prussia there are two *Feldprobste* under the War Minister—one Lutheran, one Catholic. The latter is a bishop and has spiritual authority over soldiers. To army corps and divisions chaplains of both faiths are assigned.

CHAPLEAU, shȧ'plō', Sir Joseph Adolphe (1840–98). A Canadian politician. He was born at Ste. Thérèse de Blainville, Quebec, was educated at the colleges of Terrebonne and St. Hyacinthe, and in 1861 was called to the bar. He sat in the Quebec Legislature for Terrebonne, and was at different times Solicitor-General, Provincial Secretary, Provincial Premier, and Minister of Agriculture and Public Works in the government of Quebec. He was also for a time leader of the Conservative Opposition in that province. In 1882 he entered the cabinet of Canada as Secretary of State, under Sir John Macdonald. This office he held until 1892, when he was appointed Minister of Customs and subsequently Lieutenant Governor of Quebec. For some years he occupied the chair of international law in the Montreal section of Laval University. In politics he was a determined Conservative, and as an orator he was perhaps the most brilliant among French Canadians.

CHAPLET (OF. *chapelet,* dim. of *chapel,* Fr. *chapeau,* hat, from ML. *capellus,* hood, dim. of *capa, cappa,* hood, mantle). A garland or headband of leaves and flowers; sometimes also of gold or jewels. In heraldry a chaplet is always composed of four roses, the other parts being leaves.

CHAPLIN, shȧ'plăn', Charles (1825–91). A French painter. He was born of English parents at Les Andelys, France, and studied under Drolling and at the Ecole des Beaux-Arts. He was principally known for his decorations in the Tuileries, the Elysée, and other public and private buildings in Paris. His portraits of women and children, in which he follows the traditions of the great English portrait painters of the eighteenth century, are much praised. Chaplin was a popular teacher. One of his best pictures, "Souvenirs," is in the Luxembourg; another, "Haidee," is in the Metropolitan Museum, New York. He etched after Rubens, Watteau, and some of his own works.

CHAPMAN (AS. *cēapman,* trader, OHG. *choufmann,* Ger. *Kaufmann,* from *cēap,* barter, business + *mann,* man): A trader, but popularly applied in a more limited sense to a dealer in small articles, who travels as a peddler or attends markets. The term is not in current use, however. Chapman is from *chap,* equivalent to *cheap,* a word which in its origin signified a market or place for trading; hence, *Cheapside, Eastcheap.* See Chapbooks.

CHAPMAN, Alvan Wentworth (1809–99). An American botanist. He was born at Southampton, Mass., and graduated at Amherst College in 1830. He was a botanist of exceptional ability, and a genus of plants, *Chapmannia,* was named after him. He published the work entitled *Flora of the Southern United States* (1860; 3d ed., 1897).

CHAPMAN, Carlton T. (1860–). An American marine and battle painter and illustrator. He was born at New London, Ohio, and received his first artistic instruction at the National Academy of Design and the Art Students' League in New York, and afterward at the Académie Julian in Paris. He made a specialty of depicting the naval battles of the United States, from John Paul Jones to the Spanish-American War, and his representations show a remarkable knowledge of the structure and manœuvres of battleships, both past and present. His most recent works include "The Derelict" and "The U. S. S. Gloucester and the Spanish Torpedo Boats" (1904); "A Squally Day—North River," "The Walls of New York," and "Off Ellis Island" (1905); "The Argus and the Pelican," "The Bonhomme Richard and the Serapis," and "The Lighthouse" (1910); "O'er the Dark Sea," "The Pacific Coast," and "October" (1911); "The Mystic Pool" and "Battle of Cape St. Vincent" (1912). He was elected a member of the National Academy of Design and received medals at the Pan-American Exposition at Buffalo in 1901 and at the Charleston Exposition in 1902.

CHAPMAN, Frank Michler (1864–). An American ornithologist, born at Englewood, N. J. He was appointed assistant curator in vertebrate zoölogy in the American Museum of Natural History, New York City, in 1887. In 1897 he was elected to the presidency of the Linnæan Society of New York. He made some excellent close-range photographic studies of bird life, and in addition to many contributions to the *Auk,* of which he became associate editor, and to *Bird Lore,* of which he became editor in chief, he published a *Handbook of Birds of Eastern North America* (1895); *Bird Life, a Guide to the Study of our Common Birds* (1897); *Bird Studies with a Camera* (1900); *A Color Key to North American Birds* (1903); *The Economic Value of Birds to the State* (1903); *The Warblers of North America* (1907); *Camps and Cruises of an Ornithologist* (1908).

CHAPMAN, George (c.1559–1634). An English poet and dramatist, born near Hitchin, Hertfordshire. According to Anthony Wood, he studied at Oxford and Cambridge. In 1598 he was already known as a successful playwright. Among his earliest and best plays are: *The Blind Beggar of Alexandria* (printed 1598); *All Fooles* (printed 1605); *Eastward Hoe!* in collaboration with Jonson and Marston (1605); *The Gentleman Usher* (1606); *Bussy d'Ambois,* a tragedy, the most popular of all (1607); *The Conspiracy and Tragedy of Charles, Duke of Byron* (1608); *May-Day* (1611); *The Widdowe's Teares* (1612); and *Cæsar and Pompey* (1631). Though Chapman's plays are usually weak in plot and in the development of character, they abound in striking passages. Besides plays, Chapman wrote much else: *The Shadow of Night* (1594); *Ovid's Banquet of Sence* (1595); *De Guiana, Carmen Epicum* (1596); a continuation of Marlowe's *Hero and Leander* (1598); *The Tears of Peace* (1609), and several other poems. He is, however, best known as the first translator of Homer into English verse. The *Iliad* appeared in installments (1598–1611); likewise the *Odyssey* (1614–15). Both were pub-

lished together in 1616. For the former, Chapman employed rhymed verse of seven accented syllables; for the latter, rhymed verse of five accented syllables. The translation of the *Iliad* has been criticized for its inaccuracy. On the other hand, it has been praised for its rapid movement, and it is a noble poem. Like Pope's *Iliad*, however, but on different grounds, it is scarcely Homeric. The complete works of Chapman, in 3 vols., were edited by Shepherd, with an elaborate introductory essay by Swinburne (London, 1874–75). A literal reprint of the plays was published by Pearson (London, 1873). Selections from the plays are to be found in the "Mermaid Series," edited by Phelps (London and New York). Consult: Coleridge, *Literary Remains*, vol. i (London, 1836–39); Swinburne, *George Chapman: A Critical Essay*, a reprint of the introduction to the Shepherd edition named above (London, 1875); Matthew Arnold, the essay "On Translating Homer" (1895); Ward, *History of English Dramatic Literature*, vol. ii (1899); Lohff's *George Chapman's Ilias Uebersetzung* (Berlin, 1903); and a facsimile reproduction of a curious play, *Alphonsus*, carefully ed. by H. F. Schwarz (New York and London, 1913).

CHAPMAN, JOHN JAY (1862–). An American author, born in New York City. He was educated at Harvard University, was admitted to the bar in 1888, and practiced law until 1898. Meanwhile he had attracted attention as an essayist of unusual merit. His work is marked by originality and felicity of expression, and in the opinion of many critics has placed him in the front rank of the American essayists of his day. His publications include *Emerson and Other Essays* (1898); *Causes and Consequences* (1898); *Practical Agitation* (1900); *Four Plays for Children* (1908); *The Maid's Forgiveness* (1908); *A Sausage from Bologna* (1909); *Benedict Arnold: A Play for a Greek Theatre* (1911); *Learning and Other Essays* (1911); *William Lloyd Garrison* (1913).

CHAPMAN, J. WILBUR (1859–). An American Presbyterian clergyman and writer, born in Richmond, Ind. He graduated from Lake Forest University in 1879 and from Lane Theological Seminary in 1882, and, being ordained to the Presbyterian ministry, was pastor of the First Reformed Church at Albany, N. Y., and of the Bethany Presbyterian Church at Philadelphia. After three years (1893–96) of evangelistic work, in which he was very successful, he was again for a time pastor of Bethany Church; and from 1900 to 1905 he filled the pulpit of the Fourth Church of New York. In 1903 he was appointed executive secretary of the General Assembly's committee of evangelistic work for the Presbyterian church, and later became representative at large for this committee. His writings include *The Lost Crown; The Secret of a Happy Day* (1899); *The Surrendered Life* (1899); *Life and Work of Dwight L. Moody* (1900); *Present-Day Evangelism* (1903); *Present-Day Parables* (1911); *The Problem of the World* (1911); *Chapman's Pocket Sermons* (1911); *Revival Sermons* (1911); *Personal Touch* (1912); *Present-Day Evangelization* (1912).

CHAPMAN, MRS. MARIA (WESTON) (1806–85). An American reformer, prominent as an Abolitionist during the antislavery struggle. She was born in Weymouth, Mass., was educated partly there and partly in England, and in 1829–30 was principal of the Young Ladies' High School in Boston, Mass. In 1830 she married Henry G. Chapman, who died 12 years later. After 1834 she was active as an Abolitionist, writing much for the press and speaking occasionally in public. She was treasurer for several years of the Massachusetts Antislavery Society, and was the editor of the *Liberty Bell*, an antislavery annual, which, says Samuel J. May, "year after year rung out the clearest notes of personal, civil, and spiritual liberty." She wrote the pamphlets *Right and Wrong in Massachusetts* (1839) and *Right and Wrong in Boston* (1836), which had a wide circulation, and compiled the official antislavery hymn book, *The Songs of the Free* (1836). From 1848 to 1856 she lived in Paris, France. She was an intimate friend of Harriet Martineau, and published the latter's *Autobiography, with Memorials*, in 1877.

CHAPMAN, WILLIAM (1850–). A Canadian poet. He was born at St. François de la Beauce, P. Q., and was educated at Levis College. He studied law, afterward engaged in commercial pursuits, and later entered the civil service of the Province of Quebec. He was for some time in journalistic work in Quebec and Montreal; but in 1902 became a French translator for the Dominion Senate and removed to Ottawa. His publications include: *Les Quebecquoise* (1876); *Le laureat* and *Les deux Copains*, two critical works (1894); *Les aspirations* (1904), which received the highest prize of the French Academy; and *Les Rayons du Nord* (1910), which also gained the highest prize of the French Academy.

CHAPONE, shâ-pōn′, HESTER (1727–1801). An English essayist, born at Twywell, Northamptonshire. When 10 years old she wrote a romance entitled *The Loves of Amoret and Melissa*, and while still very young became proficient in Italian, Latin, music, and drawing. She wrote for the *Rambler*, *Adventurer*, and *Gentleman's Magazine*, but is best remembered by her *Letters on the Improvement of the Mind* (1772), which went through many editions. In 1760 she married Mr. Chapone, an attorney, who died 10 months afterward. Her *Works, with a Life Drawn up by her own Family*, appeared in 1807, in 4 vols.

CHAPPAUL. See SQUAWFISH.

CHAPPE, shâp, CLAUDE (1763–1805). A French abbé and inventor, born in Brûlon (Sarthe). In 1792 he contrived the first working ocular telegraph of importance. His "semaphore" consisted of an upright post, on the top of which was fixed a transverse bar, and at the ends of the bar two smaller arms movable on pivots. The position of the bars represented letters or words; and, by means of such machines placed at remote but easily visible points, messages were conveyed 50 leagues in a quarter of an hour. Almost until electric telegraphy was introduced, Chappe's semaphore was used for military purposes, and especially for noting the arrival of ships, in nearly all the countries of Europe. A similar invention had been produced by Hooke as early as 1684, and Chappe was so harassed by charges that he had stolen his ideas from others that he committed suicide. Consult the *Histoire de la télégraphie* (1824) by his brother, Ignace Urbain Jean Chappe (1760–1829).

CHAPPE D'AUTEROCHE, shâp′ dō′trōsh′, JEAN (1722–69). A French astronomer, born at Mauriac, Auvergne, an uncle of the preceding.

He was ordained to the priesthood, but afterward devoted himself to astronomy. In 1761 he observed the transit of Venus at Tobolsk, and he wrote a *Voyage en Sibérie fait en 1761* (2 vols., Paris, 1768). In reply to his criticisms of Russia expressed in this work, Catharine II and Shuvaloff caused the publication of the *Antidote ou examen du mauvais livre superbement imprimé, intitulé: Voyage de l'abbé Chappe d'Auteroche* (1771). Chappe's report on the transit of Venus, observed by him in California (where he died) in 1769, was published in Paris (1772).

CHAPPED HANDS. A form of eczema (*eczema fissum*) produced by undue exposure to extremes of cold and heat, and affecting chiefly the most exposed joints, over which the skin swells and cracks, with itching, pain, and heat. In severe cases there is ulceration, which is difficult to heal in proportion to the length of time the disease has lasted. Chapping may generally be avoided if the hands are washed always with tepid water and a bland soap, and not habitually exposed to great cold or wind, or, when cold, to the heat of a fire. They should not be washed very frequently, and always thoroughly dried. When formed, the lesions may be treated with oxide of zinc ointment; or with dilute solution of borax in glycerin and rose water; or with glycerin alone, diluted with water; the hands in any case being protected by warm gloves in cold weather. See FROSTBITE.

CHAPRA, or **CHUPRA**, chŭp'rà. A town in India, in the Province of Behar, Bengal, on the north bank of the Ganges, at its confluence with the Gogra 35 miles west of Patna (Map: India, D 4). It extends nearly a mile along the river and has several pagodas, mosques, and churches. The government conducts an English school, and there are also private high schools and several Christian missions. There is trade in cotton, sugar, saltpetre, opium, linseed, and shellac. Pop., 1901, 45,901; 1911, 42,473.

CHAPTAL, shàp'tàl', JEAN ANTOINE, COUNT DE CHANTELOUP (1756–1832). A French chemist and statesman. He studied medicine and chemistry at Montpellier, and became professor of chemistry there in 1781. Subsequently he established chemical works near by, and for producing chemicals which had hitherto been imported he was ennobled. The Spanish government offered him a large pension to go to Spain and apparently Washington invited him to come to America. During the Revolution he was imprisoned for a time for a *Dialogue entre un Montagnard et un Girondin*. In 1793 the Committee of Public Safety put him in charge of the saltpetre works of Genelle. After the 18th Brumaire (Nov. 9, 1799) he was made a Councilor of State by Napoleon. As Minister of the Interior, succeeding Lucien Bonaparte, he established chambers of commerce and a school of arts, and in many ways contributed to the material development of the country. In 1804 he lost Napoleon's favor, but he was recalled the following year and made a member of the Senate. Upon the return from Elba, he was made Director General of Commerce and Manufactures and Minister of State. The downfall of the Empire sent him to private life, but in 1816 he became a member of the Academy of Sciences. His most important works were on practical chemistry, especially of agriculture and viticulture and wine making.

CHAPTER. A stated assembly of monks or canons; from this, the canons and other dignitaries of a cathedral or collegiate church, considered as the council of the bishop. The name arose from the practice of reading at daily meeting a chapter of the rule under which the monks or canons lived. It is applied in modern usage to the body of canons, whether in a Roman Catholic or Anglican cathedral. They have special stalls assigned to them in the choir of the cathedral and usually a house in the precincts. The obligations of members of the chapter are substantially the same in both, and include daily participation in divine service, residence during a fixed portion of the year, and assistance in the deliberations of the body. Roman Catholic canons are distinguished by the title "very reverend" and by permission to wear the rochet and mozetta in choir. The bishop in both churches may appoint honorary canons, who are not members of the chapter. It was formerly the custom so to appoint secular princes; thus the Emperor was always an honorary canon of Cologne. Consult Bouix, *De Capitulis* (Paris, 1852).

CHAPTER COFFEEHOUSE. An eighteenth-century resort for wits and literary men. Its site is on the south side of Paternoster Row, London, at the corner of Chapter-House Court, St. Paul's. It is at present a tavern.

CHAPTER HOUSE (Eng. *chapter*, Fr., OF. *chapitre*, from Lat. *capitulum*, chapter, dim. of *caput*, head + *house*). The building in which the monks and canons of monastic establishments, and the dean and chapter of cathedral and collegiate churches, meet for the management of the affairs of their order or society. (See CATHEDRAL; CHAPTER.) Chapter houses frequently exhibit the most elaborate architectural adornment; as, e.g., those at York, Southwell, and Wells. The original stained-glass windows remain at York and are of exquisite beauty. On the walls of that at Westminster the original fresco painting has been discovered. Chapter houses are of various forms: those at York and Westminster are octagonal; those at Oxford, Exeter, Canterbury, Gloucester, etc., are parallelograms; Lichfield is an oblong octagon; Lincoln, a decagon; and Worcester, a circle. They are always contiguous to the church and are generally placed to the west of the transepts. They generally either open into the church or are entered by a passage. Chapter houses were often used as places of sepulture and have sometimes crypts under them, as at Wells and Westminster.

CHAPTERS, THE THREE. The name given to the condemnation issued by the Emperor Justinian in 544 against the three persons or writings —viz., (1) the person and writings of Theodore of Mopsuestia (q.v.); (2) the writings of Theodore against Cyril and for Nestorius; (3) the letter which Ibas of Edessa is said to have written to the Persian Maris. The word "chapter" in this use was understood to mean a form of anathema which threatened with excommunication every one who maintained the deprecated doctrine. The Emperor interfered in the theological disputes of the period in the interest of orthodoxy. Unwittingly he stirred up a great controversy, because he seemed to be condemning the Council of Chalcedon (451). Consult Harnack, *History of Dogma*, vol. iv (New York, 1900).

CHAPU, shà'pu', HENRI MICHEL ANTOINE (1833–91). A French sculptor. He was born at Le Mée, Seine-et-Marne, and studied in Paris

under Pradier and Duret, and in the Ecole des Beaux-Arts, winning the Roman prize in 1855. His art represents academic-classical tendencies, strongly modified by the modern naturalistic influences, which increase in his later work. His numerous works include several monuments, among them those of Henri Regnault (Ecole des Beaux-Arts)—of which the celebrated figure "Youth" forms a part—the novelist Flaubert, and the brothers Galignani. Among his portrait busts are those of Léon Bonnat, Alexandre Dumas (Comédie Française), Carnot, and Alexandra, the Princess of Wales. His ideal and mythological subjects include "Mercury Inventing the Caduceus" (Luxembourg), the "Transformation of the Nymphe Clytie" (Dijon), and "The Cantata," on the façade of the Paris Opéra. His masterpiece is the kneeling statue of "Joan of Arc at Domrémy" (Luxembourg), in which the expression of intense spiritual exaltation is quietly and effectively rendered. Consult his biography by Fidière (Paris, 1894).

CHAPULTEPEC, chä-pōōl'tä-pĕk' (Aztec, hill of the grasshoppers). A small hill, 3 miles southwest of the city of Mexico, rising about 150 feet above the surrounding plain. On it the Aztec monarchs are said to have made their summer home; and here, in 1785, Galvez, then Viceroy of Mexico, began to erect an imposing fortified castle, which, though never fully completed, was subsequently used partly as a military school and partly as a national observatory. In the war between Mexico and the United States the hill was strongly fortified by the Mexicans and was the scene (Sept. 12–13, 1847) of the last serious conflict of the war. After the battle of Molino del Rey (q.v.) Scott planned a movement against Chapultepec and on September 12 opened a heavy bombardment, under cover of which, on the following day, Generals Pillow and Quitman, supported respectively by Generals Worth and Smith, made gallant assaults, the former carrying the fortifications on the west and the latter on the southeast; and the Mexicans, after making a stubborn defense, were driven in confusion back towards the city. On the 14th the Americans entered the city of Mexico, and the war was virtually ended. During the three days (12th, 13th, and 14th) the Americans lost 863 in killed and wounded (General Pillow being among the latter), while the Mexicans are known to have lost a much larger number. On the side of the Americans about 7500 men were engaged; on the side of the Mexicans, about 4000. Consult H. H. Bancroft, *History of Mexico*, vol. v (San Francisco, 1885), and C. M. Wilcox, *History of the Mexican War* (Washington, 1892).. See MEXICO CITY.

CHAR (Gael. *ceara*, blood-colored, from Gael., Ir. *cear*, blood). A name given to the numerous varieties of *Salvelinus alpinus*, a fish of the salmon family, and extended to several American "trout." The char has smaller scales than the true trout (*Salmo*), differs in the structure of the vomer, and has red instead of black spots, especially during the breeding season. The color is "grayish or green above, the lower parts red, especially in the male; lower fins anteriorly margined with white. Sides of body with round red spots; back not marbled." This species has a wide distribution, occurring in cold lakes and mountain streams of central and northern Europe, of northeastern America, and probably also in Siberia. It is extremely variable, and has consequently received a host of specific names, such as "saibling," "sälbling," "ombre chevalier," "Greenland trout," etc. The chars "are by far the most active and handsome of the trout, and live in the coldest, clearest, and most secluded waters" (Jordan and Evermann). The best known of the distinctively American chars is the brook trout, or speckled trout; but trout of the Rangeley Lakes, in Maine, is somewhat nearer the European type. See TROUT.

CHARACEÆ, kä-rā'sē-ē. See CHARALES.

CHAR'ACTER (Lat., from Gk. χαρακτήρ, *charaktēr*, feature, graving tool, from χαράσσειν, *charassein*, to engrave). A name given in ethics to the nature of a self-conscious agent. This nature manifests itself in and as the continuity of the various successive voluntary and habitual acts of the agent. Character has popularly been construed as a sort of causal substrate, underlying acts of conduct and giving rise to them. This popular conception has been responsible for the difficulties ordinarily thought to be involved in free will (q.v.). The conception of character not as the substrate, but as the temporal continuity, of a man's voluntary acts and of his habits enables us to escape all these difficulties, and also keeps us in touch with the facts as they actually appear in experience. No one has ever known his own or his neighbor's character as a substrate. But what every one knows is the general way in which he or another acts, and that is what constitutes character. It is upon this experienced character of a man that we pronounce our moral judgments, condemning one character and approving another. A stable character is one in which the successive acts form a continuity according to some recognized or recognizable fixed principle. A strong character is one in which the principle controlling the successive acts maintains itself against temptations which in the average person would be effective. A good character is one whose successive acts are prevailingly directed towards beneficent social ends. Consult Whitby, *The Logic of Human Character* (London, 1905); Eliot, *The Happy Life* (New York, 1905); MacCunn, *The Making of Character* (New York, 1900). See SUBSTANCE; ETHICS; DETERMINISM.

CHAR'ACTERIS'TIC. A term variously employed in mathematics, requiring specific definition in each case. The integral part of a logarithm is called its characteristic; thus, in $\log 125 = 2.0969$, $\log 0.013 = \bar{2}.1139$, $\log 5 = 0.6990$, the characteristics of the three logarithms are respectively, 2, −2, and 0. The characteristic of the common logarithm of a number containing an integral part is one less than the number of integral places; that of a decimal is negative, and is one more, in actual value, than the number of ciphers preceding the first significant figure. On account of this simple relation the characteristic is not ordinarily given in the tables of common logarithms.

In the method of characteristics due to Chasles (q.v.), which appeared in the *Comptes rendus* (1864), may be found the first trace of the "numerative geometry," the object being to determine how many geometric figures of given definition satisfy a certain number of conditions. A number which expresses how many simple singularities may replace a higher singularity of an algebraic curve or surface is called a characteristic number. The elementary right-angled triangle, whose hypotenuse is sensibly equal to the element of the arc of a curve,

was called by Pascal the characteristic triangle. In the application of determinants (q.v.) to the solution of equations the minors of a certain order in the resultant may not all vanish, while all minors of higher order become zero, in which case the equations have a known number of solutions. The number expressing the highest order in which some minor does not vanish is called the characteristic of the determinant. In the theory of functions (q.v.) certain rational integral functions are called characteristic functions. In the theory of certain types of differential equations there are certain algebraic equations every root of which determines an integral of the given differential equations. These are called characteristic equations.

CHARADE, shȧ-rād′ (Fr., Languedoc *charrade,* idle talk, probably from Sp. *charrada,* speech or action of a *charro,* clown). A form of amusement which consists in dividing a word of one or more syllables into its component syllables or into its component letters, something predicated of each; and then, the whole being reunited, and something predicated of that also, the reader or listener is asked to guess the word. As a specimen of the charade depending upon syllables, we adduce the following:

"My *first* is plowed for various reasons, and grain is frequently buried in it to little purpose. My *second* is neither riches nor honors, yet the former would generally be given for it, and the latter are often tasteless without it. My *whole* applies equally to spring, summer, autumn, and winter; and both fish and flesh, praise and censure, mirth and melancholy, are the better for being in it. Answer: *Sea-son.*"

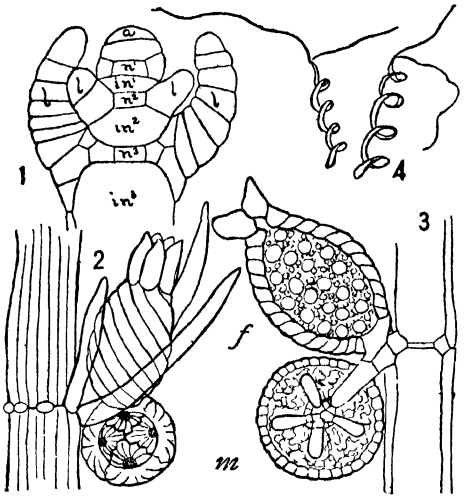
As a specimen of the second class of charades, we take the following example from the French:

"Quatre membres font tout mon bien,
Mon dernier vaut mon tout, et mon tout ne vaut rien."

The word is *zéro.* It is composed of four letters, of which the last (viz., *o*) is equal to *zero;* the whole, zero itself, being equal to nothing.

But, besides charades of this nature, there is another kind, rather popular at evening parties —the *acted* charades—the character of which is entirely dramatic. Half a dozen or so of the company retire to a private apartment, and there agree to select a certain word as the subject of the charade. The next things done are to take the first syllable and arrange a little scene and dialogue, each member taking a certain part. This being accomplished, the amateur actors return to the drawing-room and commence their performance, the rest of the company constituting the spectators. Care is taken to mention conspicuously, and yet not obtrusively, in the course of the dialogue, the syllable which is the subject of the scene. On its conclusion the party again retires to devise a new series of incidents for the next syllable, and so on. Finally, they retire to contrive the final scene, into which the whole word must be dexterously introduced at an odd moment, when the spectators are thought to be off their guard. The company are then asked to guess the word. For the effective performance of a charade of this sort, the actors must possess a good share of inventiveness, self-possession, and ready talk, as the greater portion of the dialogue has to be extemporized.

CHARALES, kȧ-rā′lēz (Neo-Lat. nom. pl., from Gk. χαρά, *chara,* delight, from χαίρειν, *chairein,* to rejoice). Usually classed as the most highly developed order of the Green Algæ, Chlorophyceæ (q.v.). They are often called "stoneworts," because the bodies of certain species, notably those of *Chara,* are incrusted with lime. The body of Charales consists of a



CHARALES: 1, apex, showing apical cell (*a*), the succession of nodal (*n*) and internodal (*in*) cells, and the young leaves (*l*), 2, oogonium (above) and antheridium, 3, the same enlarged and showing connections; 4, sperms

stem differentiated into nodes and internodes. Each node consists of a plate of cells and gives rise to whorls of branches which were formerly regarded as leaves. Each internode consists of a very much elongated cell, which in *Chara* is invested by small cortical cells, and in *Nitella* remains uncovered. For this reason the internodal cells of *Nitella* are peculiarly favorable for showing the movement of protoplasm. The nodes produce two kinds of branches: those of limited growth, which arise in a whorl; and those of indefinite growth, that resemble the parent axis. It is upon the branches of limited growth that the sex organs occur, arising from the nodes of these branches. The female organ consists of a large cell containing the egg, surrounded by spirally wound filaments, whose tips form a sort of crown at the top of the organ. This whole structure is called the oögonium, and it differs from the ordinary oögonium of Thallophytes in being incased by the spirally wound filaments. The male organ (antheridium) is a spherical, many-celled structure arising near the oögonium. It is the most complex male organ known in the plant kingdom. The wall consists of platelike cells called shields, each of which bears within a stalk, and from the tip of the stalk there arises a variable number of long filaments. When the antheridium is opened, it seems to contain a tangle of these filaments, each of which consists of approximately 200 cells, and each cell produces a sperm. The sperm output of a single antheridium may range between 20,000 and 50,000. Although Charales are included among the Green Algæ, there seems to be no question but that this is an arbitrary association. They differ from Green Algæ (see ALGÆ) in their vegetative body, sex organs, sperms, and life history, and in all of these particulars the resemblances are with the higher plants. The opinion is general that they should either be isolated as

a distinct group of Thallophytes or should constitute a group between Thallophytes and Bryophytes. The North American genera and species of Charales have been described by Allen, *The Characeæ of North America* (New York, 1888); Braun, *Fragmente einer Monographie der Characeen*, ed. by Nordstedt (Berlin, 1882); Filarsky, *Die Characeen* (Budapest, 1893).

CHARBON, shär'bŏn. See ANTHRAX.

CHARBON ROUGE, shär'bôN' rōōzh' (Fr.), or RED CHARCOAL. A variety of charcoal obtained by subjecting wood to the action of heated air from furnaces, or of steam, which has been raised to a temperature of 572° F. Air-dried wood, by the ordinary process of charring, yields at the best 21 to 26 per cent of black charcoal; but when acted on by heated air or steam, as mentioned above, 36 or 42 per cent of charbon rouge is obtained. It is used in the manufacture of gunpowder. It has a dark-red color and consists of about 75 per cent pure carbon and 25 per cent hydrogen and oxygen.

CHAR'CAS. See CHUQUISACA.

CHAR'COAL (probably from ME. *charken*, to crackle, AS. *cearcian*, to creak, variant of *cracian*, to crack + *cole*, coal; less plausibly from *char*, turn, from AS. *cerr*, Ger. *Kehr*, turn + *cole*, coal). A black, porous substance burning without smoke or flame, and formed by the imperfect combustion of organic matter, either animal or vegetable. *Animal charcoal* is produced by calcining the bones and ivory of animals in closed retorts. In this process the charcoal proper, which consists of the earthy and saline portions of the bone, combined with carbon, is left in the retort, while the volatile matter is allowed to escape into another compartment, where it is distilled. The escaping gas contains, among its other components, an oil which, when burned in closed chambers, deposits a soot which is known as *boneblack* or *ivory-black* pigment. (See LAMPBLACK.) Animal charcoal, or boneblack, is itself a most useful material in the arts, on account of its power of absorbing coloring matter and odors. It is the best material known for filtering saccharine solutions (see SUGAR), and various processes have been invented for recalcining boneblack after it has been used until no longer effective.

Wood charcoal may be produced either in mounds formed by simply covering piles of wood with earth or sand, or in retorts in connection with the manufacture of acetic acid and wood alcohol. If the former method is employed, the wood is fired usually at the top, a central space being left from bottom to top for the progress of the fire. The gases are allowed to escape through holes left in the top. By this method the yield of charcoal is not over 20 per cent, while all the volatile by-products are lost. By the retort method about 30 per cent of charcoal is obtained. A charcoal furnace is usually a dome-shaped structure with openings at the top and side for putting in the wood and a pipe or tube near the top for the escape of the volatile products. The wood rests on grates, and the quantity of air is regulated by a closely fitting ash-pit door. The wood is fired at the bottom, and when the process of combustion has sufficiently advanced, the ash-pit door is closed. The wood is now slowly carbonized, and the gaseous products escape into another chamber, where they are treated as described under LAMPBLACK.

Wood charcoal has many uses. It is employed to some extent as a fuel (q.v.), a polish, and a filter, but its chief use is as an absorbent of gases and aqueous vapors. It is an ingredient in gunpowder and fireworks. See WOOD DISTILLATION.

CHARCOAL, RED. See CHARBON ROUGE.

CHARCOAL BLACKS. Pigments prepared both from animal and vegetable substances, e.g., burnt ivory, bones, vine twigs, peach stones, nut and other shells, the smoke of resin condensed, etc. See CHARCOAL.

CHARCOT, shär'kō', JEAN BAPTISTE ETIENNE AUGUSTE (1867–). A French Antarctic explorer, born at Neuilly-sur-Seine. In 1890–94 he was an interne at the Hospital of Paris and at the same time an investigator in the Pasteur Institute. From 1896 to 1898 he was head of the clinic in the faculty of medicine of the University of Paris. In 1903–05 and in 1908–10 he was leader of Antarctic scientific expeditions, and later he became director of the Marine Laboratory of Higher Studies. His Antarctic expeditions on the *Pourquoi Pas?* took him as far as Adelaide Island, and he saw the inaccessible coast of Alexander I Land. His publications include: *Arthropodes* (1907); *Expédition antarctique française, 1903–1905* (1908); *Deuxième expédition antarctique française, 1908–1910* (1911); *"Pourquoi Pas?" dans l'Antarctique* (1911).

CHARCOT, shär'kō', JEAN MARTIN (1825–93). A French neurologist, born in Paris. He received his degree of M.D. in 1853 and in 1856 was appointed physician to the Central Bureau of Hospitals. In 1873 he was elected a member of the Academy of Medicine, in the section of pathological anatomy, and in the same year became professor of pathological anatomy in the faculty of medicine in Paris, a position which he exchanged in 1882 for the professorship of diseases of the nervous system which was created especially for him and which he occupied until his death. He wrote: *De l'expectation en médecine* (1857); *Leçons cliniques sur les maladies des vieillards* (1868); *Leçons sur les maladies du système nerveux* (4th ed., 1880); *Leçons sur les maladies du foie, des voies biliaires et des reins* (1877); *Localisations dans les maladies du cerveau et de la moelle épinière* (1876–80); *Leçons sur les maladies du système nerveux faites à la Salpêtrière* (1880). Charcot also annotated the French translation of Baring Garrod's *Treatise on Gout*. He was one of the editors of the *Archives de physiologie*. His researches in hypnotic suggestion were notable, but his fame chiefly rests on his original discoveries in nerve pathology.

CHARD, SWISS CHARD, or SEA KALE. A form of the common garden beet (q.v.), in which the edible portion is the enlarged fleshy stalk and midrib of the leaves. Unlike garden beets, the roots are small and woody. Chard is used as a pot vegetable for greens and salad. It is grown in the same manner as garden beets.

CHARDIN, shär'dăN', JEAN (SIR JOHN) (1643–1713). A French-English traveler, born in Paris. In 1664–69 and again in 1671–75 he made extensive journeys to Persia and India, where he had many adventures and acquired much wealth by trade in jewels. Partly because he was a Protestant, in 1681 he settled in London, where he was knighted by Charles II. In 1683 he became representative of the East India Company in the Netherlands and devoted his later years to Oriental studies. In

1686 he published a portion of the *Travels of Sir John Chardin into Persia and the East Indies*, which was completed in a French version in 1711. The best reprint is by Langlès (Paris, 1811).

CHARDIN, JEAN SIMEON (1699–1779). The principal French still-life and genre painter of the eighteenth century. He was born in Paris and studied principally with Coypel. His celebrated "Skate" (1728, Louvre) and "The Buffet," a kitchen interior, established his reputation and gained him admission to the Academy. After his first marriage, in 1731, he took up genre subjects, excelling especially in the portrayal of children, as in "Boy Blowing Soap-Bubbles" and "Girl with Cherries," and of family life, as in the celebrated "Bénédicité" ('The Blessing'), painted in 1740, the "Diligent Mother," both in the Louvre, and the "Amusements of Private Life" (1746). The best known of his portraits are a pastel of himself, now in the Louvre, and the excellent likeness of Rameau d'Alembert and Sedaine. In 1755 he reverted to still-life subjects. From 1765 to 1767 he painted a series of decorative panels for the castles of Choisy and Bellevue, of which the "Attributes of the Sciences, Arts, and Music" are now in the Louvre. His works, the largest collection of which is in the Louvre, are characterized by naïve and charming realism. His cool and restful color scheme, with its wonderful treatment of light and atmosphere, is a century in advance of his age, and he was not truly appreciated until the middle of the nineteenth century. Consult the monographs by Edmund and Jules de Goncourt (Paris, 1864) and Edmund Pilou (Paris, 1909); Dayot and Vaillat, *L'Œuvre de Chardin et Fragonard* (Paris, 1907).

CHARDON, shär'dŏn. A village and the county seat of Geauga Co., Ohio, about 30 miles (direct) east by north of Cleveland, on the Baltimore and Ohio and the Cleveland and Eastern Suburban railroads (Map: Ohio, H 2). It is the centre of an agricultural region, carries on a trade in creamery and maple products, and has a macaroni factory. The electric-light plant is owned by the village. Pop., 1900, 1360; 1910, 1542.

CHARENTE, shà'rănt' (connected with OIr., Welsh, Corn., Bret. *car*, friend, Gall. *Carentus*, Brit. *Carantinus*, Lat. *carus*, dear). A river in the west of France, rising in the Department of Haute-Vienne, about 14 miles northwest of Châlus (Map: France, S., D 3). It first flows northwest to Civray, where it turns southward into the Department of Charente to Angoulême; thence it flows westward past Châteauneuf, Jarnac, and Cognac, and, entering Charente-Inférieure, runs northwest past Saintes, and falls into the Atlantic below Rochefort, opposite the islands Oléron and Aix. This river gives its name to two departments, remarkable for the productiveness of their vineyards. Length, 224 miles. The tide is felt as high as Saintes, and the river is navigable to Angoulême, 104 miles.

CHARENTE. A department in southwest France, named after the Charente River. The raising of fruit, chestnuts, and potatoes, grazing, quarrying, and the manufacture of flour, paper, naval guns, leather, gunpowder, and brandy are the leading industries. (Map: France, S., E 3.) Pop., 1896, 356,236; 1901, 350,305; 1911, 346,424. Capital, Angoulême. Consult Coquand, *Description physique, géologique, etc., du département de la Charente* (Paris, 1859), and Lièvre, *Exploration archéologique du département de la Charente* (Angoulême, 1881).

CHARENTE-INFÉRIEURE, shà'răn'tăn'-fâ'rê-ēr'. A maritime department in the western part of France, including part of the former Province of Angoumois, with the greater part of Saintonge and a small portion of Poitou (Map: France, S., D 3). Area, 2792 square miles. Pop., 1896, 453,455; 1901, 452,149; 1906, 453,793; 1911, 450,871. It is watered on its boundaries by the Sèvre-Niortaise and the Gironde, and in the centre by the navigable Charente and the coast stream Sendre. The surface is level, and the department is one of the most fertile in France. The soil produces hemp, flax, saffron, oats, wheat, rye, potatoes, and fruit. The industries include the manufacture of salt, brandy, machinery, porcelain and fayence ware, and oyster and pilchard fisheries. The chief harbors are those of Rochefort and La Rochelle; the latter town is the capital of the department.

CHARENTON-LE-PONT, shà'răn'tôn'-le-pôn' (connected with Gall. *Carentus*, Lat. *carus*, dear). A town of France, in the Department of Seine, situated on the right bank of the Marne, where it meets the Seine 1 mile southeast of Paris (Map: Paris and Vicinity). The bridge over the river, which is considered one of the keys of the capital, is defended by two forts, forming a part of the fortifications of Paris. At the other side of the river is the national lunatic asylum, formerly called Charenton Saint-Maurice, now Saint-Maurice. This establishment also contains a hospital for the care of accident victims in Paris, and a hospital for workingmen. The industries of Charenton are boat building, piano making, and the manufacture of porcelain and India-rubber goods. Pop., of commune, 1901, 17,980; 1911, 19,499.

CHARES, kā'rēz (Lat., from Gk. Χάρης) (?–c.324 B.C.). An Athenian general, the son of Theochares. He was appointed general in 367 B.C., and in the same year relieved the Phliasians, who were besieged by the Argives and the Sicyonians. When Oropus was taken, he was recalled from the Peloponnesus; but soon after, the Athenians and Arcadians, having entered into an alliance, returned and made an unsuccessful attempt to seize Corinth. In 361 he was sent to Corcyra, where, through his uncompromising bearing, he destroyed the Athenian influence. In 358 or 357 he was in the Chersonese, whither he had been sent to demand the withdrawal of Cersobleptes. When the Social War broke out and Chios revolted from Athens, Chares and Chabrias (q.v.) led an attack on the island and town—the former at the head of a land force, the latter with a fleet. The attack proved unsuccessful, Chabrias being killed and Chares forced to retire. In 356, being sent, in joint command with Iphicrates, Menestheus, and Timotheus, to relieve Samos, he fought alone at Embatta, against the judgment of the other commanders, and was defeated. At the trial of accountability Chares appeared as the formal accuser of his colleagues, who were convicted and deposed. Chares was now put in sole command, and, in order to secure funds for his troops, in 355 he joined the rebellious satrap Artabazus, and gained a brilliant victory over the King's forces.

Much booty was obtained, and Chares was rewarded by the Athenians with a golden crown. In 353 he recaptured Sestos, which had revolted from Athens during the Social War, and in 349 he was sent to the aid of Olynthus, with what result we do not know. In 338 he fought, as one of the Athenian generals, at Chæronea. After the seizure of Thebes, his surrender being demanded by Alexander, he withdrew from Athens, but appeared again in 332 at Mitylene, at the head of 2000 Persians. At the approach of the Macedonian fleet he surrendered the town on condition that the troops be allowed to depart in safety.

CHARES (Gk. Χάρης). A Grecian worker in bronze, a native of Lindus, and the designer of the Colossus of Rhodes. He lived in the third century B.C. and was a pupil of Lysippus. See COLOSSUS.

CHARETTE DE LA CONTRIE, shȧ'rĕt' de lȧ kôN'trē', FRANÇOIS ATHANASE (1763–96). A French Royalist, born at Couffé, Loire-Inférieure. In 1793 he became the head of the Royalist bands of Lower Poitou and finally gained control of all of Lower Vendée. He entered into a treaty with the Convention on Feb. 15, 1795, which, however, did not end the war. After several leaders of the Vendeans had been executed by General Hoche, Charette de la Contrie resumed operations. He was defeated at Saint-Cyr and then confined himself to guerilla warfare. He was severely wounded in one of his encounters with the Republican troops, and was captured, March 29, 1796, and shot at Nantes. Consult the biography by Le Bouviers (Nantes, 1823).

CHARGE (from OF., Fr. *charger*, lt. *caricare*, to load, from ML. *carricare*, to load a car, from Lat. *carrus*, car, from Gall. *carros*, OIr., Welsh, OBret. *carr*, car). The quantity of gunpowder or other explosive used in loading a gun, torpedo, or projectile. The *full* or *service charge* of gunpowder is the amount with which a gun is designed to give its maximum velocity in service. *Reduced charges* are used for target practice or for high-angle fire when it is desired to fire over an intervening obstacle and have the shell fall behind it. The charge for a projectile is called the *bursting charge*. See BALLISTICS; GUNNERY.

CHARGE, in military tactics. A sudden onset or rush of troops against the enemy. See ATTACK; BATTLE; TACTICS. For heraldic charges, see HERALDRY.

CHARGE AND SPECIFICATION. The formal written statement before a general court-martial of the offense alleged to have been committed by the accused. In the United States service a military charge consists of two parts—the technical *charge*, designating the general character of the offense, and the *specification*, giving the statement of the offense in detail. The article of war under which the offense comes is mentioned in the charge. See COURTS, MILITARY.

CHARGÉ D'AFFAIRES, shär'zhȧ' dȧ'fâr' (Fr., charged with affairs). A diplomatic agent, ranking fourth, after ambassadors, ministers, and resident ministers. He is accredited not to the sovereign, but to the Minister for Foreign Affairs of a foreign power, and he holds his credentials only from the Minister for Foreign Affairs of his own state. In the absence from his post of a regularly accredited minister or ambassador, some member of the staff, usually the Secretary of the Legation or Embassy, is appointed to serve as chargé d'affaires. When the relations of two governments are strained to such a degree as to preclude formal diplomatic relations, chargés d'affaires are employed to exercise the ordinary diplomatic functions of ministers.

CHARGE OF THE LIGHT BRIGADE, THE. A poem by Alfred, Lord Tennyson, written in commemoration of the famous episode at the battle of Balaklava (Oct. 25, 1854) and published in quarto (London, 1855). An altered version appeared under the title of *In Honorem* (1856, octavo). In the second edition the line "some one had blundered," which had been erased from the original draft, was restored. The metre is that of Drayton's "Battle of Agincourt."

CHARGER. A war horse; a saddle horse suitable for the military uses of commissioned officers; a handsome, showy saddle horse qualified for use on all ceremonial occasions; often used synonymously with *officer's mount*, meaning a horse with a minimum height of 15 hands 2 inches, weighing not less than 975 pounds. See HORSE, for a discussion of the military uses of the horse.

CHARICLEA, kăr'ĭ-klē'ȧ. Daughter of Persina, the Queen of Æthiopia, and heroine of the story, in a fourth-century novel by Heliodorus, entitled *Theagenes and Chariclea*.

CHARING (chȧr'ĭng) **CROSS.** A district on the northwest bank of the Thames between the Strand and Whitehall, adjacent to a great cross, which is 1¼ miles from St. Paul's and is at present contained within the yards of the Southeastern Railway Company. The district stands upon the old site of the thirteenth-century village of Cherringe, where in 1291 a Gothic cross was erected by Edward I as a token that the bier of his beloved wife, Eleanor, had been set down there during its journey from Grantham, Lincolnshire, to Westminster Abbey. In 1647 the cross was demolished by the parliamentary party as a relic of popish superstition. The present copy was erected near the original site in 1865. The site itself, as near as it can be guessed, is now occupied by Le Sueur's equestrian statue of Charles 1, which was cast in 1633 and erected in 1674. See CROSS.

CHARIOT (OF. *chariot*, dim. of *char*, car). In ancient times, a kind of carriage used either for pleasure or in war. Its use in war and peace was general in the East; it is common on Egyptian, Babylonian, and Assyrian monuments. It was early introduced among the Greeks and is represented on Mycenæan works of art. In the Homeric poems the chariot conveys the heroes to the field of battle and on journeys; they usually fight on foot. In historical times the war chariot was not used by Greeks or Romans, though still a part of the Persian armies. Cæsar also found chariots in use among the Britons; they are frequently mentioned in the Irish epics. The ancient chariot was a light two-wheeled car, usually with a closed front and sides, but open behind. It had no springs. It was generally of wood, strengthened by bronze or iron; the wheels had tires of bronze or iron. In the earliest times the chariot was drawn by two horses, yoked to a pole; this type was not uncommon later. (See BIGA.) The racing chariot was the *quadriga* and was drawn by four horses, harnessed abreast. The centre pair were attached to the yoke, the outer were attached, each by a single trace, to the chariot

body. The *quadriga* used in the Roman triumph was often elaborately adorned; it was drawn by white horses. The war chariots used by the Britons, Persians, and other peoples were often armed with scythes attached to the axles. For abundant illustrations of the ancient chariot in its many forms, consult Daremberg and Saglio, *Dictionnaire des antiquités*, s. v. *Currus*. Consult Ginzrot, *Die Wagen und Fahrwerke der Griechen und Romer* (1817); Leaf, *Journal of Hellenic Studies*, vol. v; Helbig, *Das Homerische Epos aus der Denkmälern erlautert* (1884); the article "Currus" in Smith, *Dictionary of Greek and Roman Antiquities* (3d ed., London, 1890). An Etruscan chariot, reconstructed, may be seen in the Metropolitan Museum, New York City. See CARRIAGE; CIRCUS.

CHARIOT RACES. See CHARIOT; CIRCUS.

CHARIS, kā'ris. In Homer's *Iliad*, xviii, 382, the wife of Hephæstus, the personification of the grace which should characterize the works of a divine artificer. For a later development of this conception, see CHARITES.

CHARISIUS, kā-rĭsh'ĭ-ŭs, FLAVIUS SOSIPATER. A Roman grammarian, born in Africa, summoned to Constantinople in 358 A.D. to take the place of Euanthius. Only a portion of the five books of his *Ars Grammatica* is preserved. It is largely a compilation, but is valuable for its many quotations from early authors. For the text, consult Keil, *Grammatici Latini* (Leipzig, 1857).

CHARISTICARIES, kăr-ĭs'tĭ-kā'rĭz (ML. *charisticarius*, from Gk. χαριστικός, *charistikos*, generous, from χαρά, *chara*, favor, from χαίρειν, *chairein*, to rejoice). In Greek ecclesiastical history, officers who had full power over the revenues of hospitals and monasteries.

CHARITABLE TRUSTS, or CHARITIES. Property, real or personal, vested in trustees to be administered by them for religious, eleemosynary, educational, or other benevolent purposes of a public nature. The origin and use of the term is due to the difficulty, more apparent than real, experienced by the English Court of Chancery in enforcing trusts created for the benefit of a class of indefinite and unascertainable beneficiaries, as a trust for the benefit of the insane, generally, or for the benefit of the poor of London. Inasmuch as there was no ascertained person having the right to invoke the jurisdiction of the court to compel the trustee to perform the duty imposed on him, such a trust was held to be unenforceable and void. To avoid this consequence when the attempted trust was of a salutary character, an early English statute, known as the Statute of Charitable Uses (43 Eliz., c. 4, 1601), was passed, declaring such trusts valid and enforceable by commissioners appointed by the Court of Chancery. Such trusts have since been known as charitable uses, or charitable trusts. It is probable that the administration of such trusts fell to some extent within the prerogative jurisdiction of the chancellor before the statute, and its principal effect was to enlarge the jurisdiction of the Court of Chancery and to define the uses which were to be recognized as charitable, as distinguished from those which, after the Reformation, were deemed superstitious and void as pertaining to the Catholic church.

The charitable trust is distinguished from the private trust, which includes all other trusts, in that (1) it always exists for charity or public beneficence; (2) its beneficiaries are indefinite and undetermined; and (3) it may create a perpetuity.

I. An enumeration of the charitable objects for which such trusts may be created and upheld is found in the statute of Elizabeth. Those objects may be grouped, as appears by the definition given, under four general heads, as follows: (1) Gifts for *strictly eleemosynary* objects, i.e., for charity in its narrow, popular sense, such as gifts for the poor, for sick, disabled, or demented persons, and for hospitals, homes, and asylums. (2) Gifts for *educational purposes*, as for schools and colleges, to build or equip libraries, and to endow scholarships, fellowships, and the like. (3) Gifts for the purposes of *religion*, such as those for the building or repairing of churches, for missions, and for spreading the gospel. (4) Gifts for *lightening the expenses of government*, such as bequests for the erection of public buildings, docks, wharves, canals, etc.

II. *Indefiniteness in the beneficiaries*, either as to the class to be benefited, or as to the individuals in a determined class who will be the objects of the bounty, is the predominant distinguishing feature of charitable uses or trusts. If the beneficiaries be definitely specified, no matter how charitable the object of the gift, it constitutes a private trust and is valid without the aid of the statute, and must be construed and governed accordingly. Thus, a trust for the support and comfort of designated persons in a certain hospital would be private, while a trust for all those who should be cared for by such an institution would be public, or charitable. This feature of trusts for charity, coupled with the liberal spirit in which courts construe such gifts, has led to the method of executing them, called *cy pres* ('as near as'). By this doctrine is meant that, when such gifts cannot be applied according to the precise intention of the donor, although the general purpose of the trust is proper, they will be employed for the purpose in a manner as near as possible to that which was designated. It assumed two forms in England. In one form it was employed by the chancellor in the exercise of a prerogative, executive power, delegated to him under the sign manual of the crown, and was carried to the extent of applying a trust for charities to *some* charitable purpose, even when the particular objects for which it was intended were illegal and void. In its other form it was exercised by the chancellor in the performance of his *judicial* functions and was applied only to such charitable trusts as were legal and valid in their inception, but which, because of some change in law or circumstances, could not be carried out in exactly the manner indicated by the donor. In this latter form, but not in the former, the *cy-pres* doctrine is recognized and applied in some, though not in all, of the American States, where trusts for charity are allowed. For example, a bequest made before the fall of slavery in the United States, to trustees, to be applied to various methods of creating a sentiment against negro slavery in America, was applied, after the close of the Civil War, by the Massachusetts courts, to the American Freedmen's Union Commission.

III. It is no objection to a trust that it necessarily suspends, during its continuance, the power of free and unrestrained alienation of property. However, when a trust is created to shift at a possibly remote period from one class of beneficiaries to another, it constitutes

what is known as a *perpetuity*. A perpetuity is an estate or interest, legal or equitable, which may vest in the beneficiary at a period more remote than (any number of) lives in being at the time of its creation plus 21 years, and was void by reason of such possible remoteness of vesting. But the beneficial character of charitable trusts led to their being recognized as an exception to this rule, and such a trust will therefore be sustained without reference to the fact that it creates a perpetuity. Similarly a provision for accumulation (q.v.), void under the same rule in case of a private trust, does not impair a charitable trust.

Gifts for charitable uses are of considerable antiquity. They were known and fostered by the Christian emperors of Rome as "pious uses," and it was in this form and under this description that the doctrine passed from the civil law into the law of England, where, as has been said above, pious or charitable uses were enforced to some extent by the chancellor long before the Statutes of 39 and 43 Elizabeth.

In England the system of charitable trusts and the method of administering them is now based upon a series of modern statutes of the most enlightened character, known as the Charitable Trusts Acts, passed in 1853, 1855, 1860, 1869, and 1888, and, lastly, upon the Mortmain and Charitable Uses Act, passed in 1891. In the United States the statutes of Elizabeth have not generally been enacted, but in most of the States the principle embodied in those acts and enforced by the English Court of Chancery has been judicially recognized as a part of the body of legal principles brought over from the mother country, and many trusts not strictly within the English statute are here held to be valid by analogy. New York, long a conspicuous exception, has recently by statute made possible the creation of trusts for charitable purposes, but there are still several States in which no distinction is made between charitable trusts and trusts for private purposes. See MORTMAIN; TRUST; PERPETUITY.

Bibliography. The literature of the subject is extensive. Among the most important works dealing exclusively with it are Shelford, *Treatise on the Law of Mortmain, and Charitable Uses and Trusts* (London, 1836); Tudor, *Law of Charities and Mortmain* (ib., 1890). Consult also the general treatises on trust and equity jurisdiction, as Perry, *Treatise on the Law of Trusts and Trustees* (5th ed., Boston, 1899), and Pomeroy, *Treatise on Equity Jurisprudence, etc.* (3d ed., San Francisco, 1905). See MORTMAIN; TRUST.

CHARITES, kăr'ĭ-tēz (Gk. Χάριτες, *Charites*). In Greek mythology, the goddesses of grace and charm, called Gratiæ by the Romans. (See CHARIS.) They were described usually as three in number, the offspring of Zeus, and were named Euphrosyne ('joy'), Thalia ('bloom'), and Aglaia ('brilliance'). Their home was on Olympus, with the Muses. They were companions also, naturally, of Aphrodite and Peitho ('persuasion'). Their oldest shrine was at Orchomenus in Bœotia, where their festival, the Charitesia, was celebrated. In later days their worship was widespread. In sculpture they usually appear as three beautiful maidens hand in hand.

CHARITIES. The public and private institutions of society whose object is the relief, without compensation and solely from the motive of human sympathy, of those suffering from poverty, sickness, and all forms of human disease.

In ancient times few such institutions existed. The unfortunate individual who was unable to care for himself had to look to the immediate circle of his nearest of kin, or, more frequently, was allowed to perish, or was actually put to death because he was regarded as a burden by the community which had to struggle for existence without being able to accumulate any social surplus of wealth. This is peculiarly the case in a nomadic society. The historical growth of the spirit of charity is briefly and admirably described in Lecky's *History of European Morals*.

The first efforts at institutional relief were those of the early Christian Church. They were carried out in response to the teaching of the Church that it is more blessed to give than to receive, that there is merit in the very act of giving, and that the future welfare of the giver is in a measure dependent on his generosity. Such a doctrine gave little thought to the effect of the gift on the recipient, or, indeed, to the welfare of the recipient after the gift was once bestowed. Naturally a reckless system of charity developed, which in some cases had to be suppressed, and in other cases, where the Church, especially in northern Europe during the Reformation period, lost most of its property and was unable to continue the support of large numbers of undeserving poor, something had to be done as a substitute by public authorities.

In this way a system of public charity grew up in England, though in the beginning it was a part of the criminal law, providing not measures of relief, but regulations and institutions for the repression of "vagabonds" and "sturdy beggars."

The earliest and most popular really charitable institutions were hospitals. Private charities, supported entirely by voluntary contributions, had their beginning, usually, in institutions for the relief of foundlings and abandoned children. By the end of the eighteenth century in Europe many such institutions existed, and the public almshouse or workhouse, supported from public funds, had been established in most countries especially for the relief of the aged poor. At the beginning of the nineteenth century a great movement for the reform and extension of these institutions began. In America the almshouse was then practically the only public institution provided for the needy and helpless. In most parts of the country no attempt was made to segregate the different classes of dependents. The evils of this system were in some degree mitigated by the free employment of outdoor relief for persons who had become destitute through no fault of their own. This plan, however, was in many cases unduly extended, with the inevitable result of pauperization of classes that might otherwise have become self-supporting. The first effort to systematize charitable relief was made in New York in the year 1842, by a committee of philanthropic citizens organized by Robert M. Hartley. As a result of the work of this committee, the New York Association for Improving the Condition of the Poor was founded in 1843. Similar associations were organized in other cities in the next three decades, and in 1876 there were 63 in existence. The object of these associations was to cover all charitable needs save those provided for by public authority.

Modern charities may be classified under the following heads: 1. Institutional care of destitute adults; 2. Care of defectives, insane, feeble-minded, epileptic; 3. The treatment of criminals; 4. Hospitals, dispensaries, nursing; 5. Care of destitute, neglected, and delinquent children; 6. Care and relief of needy families; 7. Supervisory and educational movements; 8. Preventive and constructive philanthropy. The public authorities have in most modern countries assumed responsibility for 1, 2, and 3; 4 and 5 are divided between public and private agencies; 6, 7, and 8 are still largely in private hands.

The line cannot be clearly drawn between public and private charities. Public charities are those supported entirely or in part from funds raised by taxation, while private charities are those supported by voluntary contributions, administered by societies organized for the purpose. Private charitable societies are frequently placed under some public supervision. Public charities should provide for those well-defined and more or less permanent needs of the community for the relief of which experience has been sufficient to enable us to formulate very definite rules and regulations which can be carried out, more or less mechanically, by public officials who must interpret laws more often literally than in the spirit in which they were framed, while private charities should deal with those forms of relief still in the experimental stage, with a view of demonstrating what can be done by the public authorities on a larger scale.

Private philanthropy centres in the home and the family. It views the home as the important element which must be protected and preserved. Public charity has followed private initiative, gradually taking up those institutions shown to be necessary. To protect the home, the tenements are brought under regulation. (See HOUSING PROBLEM.) To insure the family against loss of income through injury to the breadwinner or through his death, dangerous employments are regulated (see FACTORY INSPECTION) and various plans of indemnification are instituted. (See EMPLOYER'S LIABILITY; WORKINGMEN'S COMPENSATION.) The family is relieved of the burden of provision for old age. (See OLD AGE PENSIONS.) Sanatoria are built for consumptives. Children are properly cared for. (See DEPENDENT CHILDREN; JUVENILE COURTS; JUVENILE OFFENDERS; CRUELTY TO CHILDREN, PREVENTION OF.) Foundling hospitals and children's aid societies rescue the abandoned. It is sought to get at the causes of distress and to remove them rather than to minimize results of bad conditions. (See PAUPERISM; CHARITY ORGANIZATION SOCIETY; SOCIAL SETTLEMENTS.) Visiting nurses attend the sick poor, and diet kitchens furnish suitable food. Playgrounds are established for the children. Charity is becoming less sentimental and more methodical and scientific. Its administrators are trained experts. All civilized nations are pursuing similar courses. See also POOR LAWS; SOCIAL DEBTOR CLASSES. Consult: Lowell, *Public Relief and Private Charity* (New York, 1894); Warner, *American Charities* (New York, 1894); Mackay, *Public Relief of the Poor* (London, 1901); Leonard, *Early History of English Poor Relief* (Cambridge, 1900); Loch, *Charity and Social Life* (London, 1910); Devine, *The Spirit of Social Work* (New York, 1912); Gray, *History of English Philanthropy* (London, 1905); Devine, *Principles of Relief* (New York, 1904); Henderson, *Modern Methods of Charity* (New York, 1904); and current numbers of the *Survey* (New York, weekly). See CHARITABLE TRUSTS.

CHARITIES AND CORRECTION, THE NATIONAL CONFERENCE OF. An association of some 3000 members in the United States, Canada, and Mexico, who are interested in philanthropic efforts. Many of the members are actively connected with charitable activities in various cities. All shades of thought are represented. The conference has no platform and adopts, usually, only resolutions of thanks. All persons are privileged to participate in the discussions. It is simply an exchange for the comparison of views and experiences, not a body organized to accomplish any undertaking. One result of its deliberations was to arouse public interest leading to the establishment of local or State conferences and in securing needed legislation.

The first session was held in New York City in 1874 at the invitation of the Social Science Association, with which body joint meetings were held till 1878, though the proceedings were published separately after 1876. In 1879 the first separate convention met in Chicago, with delegates from 12 States. The membership and attendance have steadily increased. The State governors frequently appoint representatives, as do the mayors of large cities. Delegates from foreign lands are often present. In 1880 the first report on the organization of charity was read, and thenceforth this topic has had great attention. In 1893 a membership fee was charged, the expense previously having been met by contributions. The membership fee is $2.50, entitling the members to the volume of *Proceedings* and the quarterly *Bulletin*. These volumes contain a vast amount of valuable information on the charitable activities of America. The conference holds annual meetings in the various cities of the country. The evening sessions are devoted to general questions. Section meetings are held during the day. These sections are in charge of special committees on State supervision, needy families, children, defectives, criminals, care of sick, neighborhood improvement, etc.

Consult *Proceedings of the National Conference of Charities and Correction* (published at Boston, New York, and other cities, 1874 et seq.).

CHARITON, shăr'ĭ-ton. A city and the county seat of Lucas Co., Iowa, 56 miles south by east of Des Moines, on the Chicago, Burlington, and Quincy, and the Chicago, Rock Island, and Pacific railroads, and on the Chariton River (Map: Iowa, D 3). It is in a fertile agricultural and stock-raising region, has coal mines, and manufactures carriages and wagons, ice, cement blocks, agricultural implements, flour, windmills, tanks, pumps, pipes, etc. The city contains a public library and owns its water works. Pop., 1890, 3122; 1900, 3989; 1910, 3794.

CHARITON, kăr'ĭ-tŏn (Gk. Χαρίτων). A Greek prose writer, of Aphrodisias in Caria, the author of a romance entitled *Chœreas and Callirrhoë* (q.v.), written about 200 A.D. The views of Rohde, *Der griechische Roman und seine Vorläufer* (2d ed., Leipzig, 1900), concerning Chariton, have been corrected through the finding of a fragment of *Chœreas and Callirrhoë* in a papyrus which must be dated before 225 A.D. Consult J. S. Phillimore, "Greek Ro-

mances," in *English Literature and the Classics* (Oxford, 1912).

CHARITY, Brothers and Sisters of. See Brothers and Sisters of Charity.

CHARITY ORGANIZATION SOCIETY. Associations bearing this name or known as Associated Charities, United Charities, or Bureau of Charities exist in about 150 cities of the United States, with a large number of other societies partially adopting their methods, and in several Canadian cities. In Great Britain nearly 100 societies exist, and they are also found in Australian cities, and organizations more or less closely resembling them exist in Europe. The parent society, known as The Society for Organizing Charitable Relief and Suppressing Mendicity, was started in London in 1869 under the leadership of Mr. Goschen, then President of the Poor Law Board, the Bishop of London, the Earl of Shaftesbury, and Edward Denison. The first Charity Organization Society in America was organized in Buffalo, N. Y., in 1877, through the influence of Rev. S. H. Gurteen. The New York Charity Organization Society was founded in 1882. The primary object of the Charity Organization Society is to bring about such a coöperation between existing charities as to avoid overlapping of fields and duplication of efforts. To many of the earlier charitable societies the reason for existence was almsgiving to those in distress, little, if any, careful investigation being made as to the cause of the trouble and less attention being paid to the work of other agencies. Whenever such a condition obtains, it is always found that "charity tramps" and professional beggars abound. The very existence of these various dissociated agencies is a temptation to those on the border line of self-support to seek assistance. The charity organization societies are of course unable to prevent altogether the practices of unwise almsgiving, but through securing a measure of coöperation and of free discussion of methods they have contributed materially towards the reform of methods of charity.

Coöperation. They act as a clearing house for all philanthropic societies and individuals. Careful records are kept of all cases. These are preserved in envelopes, one for each family. In these envelopes are put all the information regarding the individual and family history, the reports of investigations, all letters and other relevant matter. The record is kept as nearly up to date as possible. These envelopes are so filed that they can be found in a moment. The records are confidential and are given only to persons or societies having a legitimate interest in the family. Their use prevents duplication and fraud. Public officials frequently find them of great assistance. The society undertakes to know just what the other organizations do. As they seek to cure distress, not merely to relieve it, whenever a case comes under their care an investigation is made of the family's condition, sources of income, possible means of assistance, friends, former employers, etc. In cases of emergency assistance is at once given or secured. Then some plan is formed—comprehensive, but subject to constant modification—and this plan is followed until, if possible, the family becomes self-supporting, or, if this is impossible, until some permanent disposition may be made so that the family may have no excuse for asking further assistance. This often involves the calling upon a number of institutions for their services. There is, however, a clearly defined end in view, so that the organizations assisting are rendering a most valuable coöperation. The Charity Organization Society does not duplicate existing agencies, but seeks to supplement them. Some charity organization societies have even had no relief fund, preferring to act wholly as mediators.

Personal Service. The pursuit of a comprehensive plan involves an immense amount of time and labor. Under the old system a sum of money or other necessities was given and the recipient disappeared from sight and notice till trouble brought him back. The Charity Organization Society seeks to show a personal, friendly interest in the family. To further this aim, a corps of "friendly visitors" is developed, who undertake to visit a family regularly, to share sympathetically in its troubles and its pleasures. The influence of this personal interest of a tactful and resourceful person upon the family life is hard to estimate. These friendly visitors are always unpaid, and thus their interest is wholly unselfish. The way is opened for all sorts of suggestions for improvement, for making the home attractive to the children and father. The friendly visitors hold regular conferences.

Social Service. Growing out of the intimate knowledge gained by frequent personal visits comes the opportunity to influence the community regarding the necessity for playgrounds, better sanitary and housing conditions, factory legislation, and the like. Such service is of the highest value, often accomplishing great reforms. The present movement to reform the tenements in New York City is largely the result of the labors of the Charity Organization Society and interested individuals. Here should be noted the possibility of handling special relief funds in times of emergency. The Charity Organization Society, with its trained force and intimate knowledge of local conditions, can act to great advantage. Mention should be made of the influence exerted to cut down unwise appropriations for supposed charitable purposes. Another valuable service is the investigation of charitable organizations for the information of intending donors. By no means the least valuable part of this social work is in getting so many persons directly interested in the work of the society.

Self-Help. The object of the Charity Organization Society is to "help to self-help." It is not sought to give something for nothing. The self-respect and the independence for the individual are always to be preserved. Work rather than alms is given. Laundries, sewing rooms, wood yards, employment bureaus, are maintained according to local needs. In some cities the vacant lots and waste places have been transformed into vegetable gardens, carried on, under expert guidance, by the poor. When necessary, the professional beggars are prosecuted; lists of unworthy alms seekers are published, to compel them to seek honest employment.

Preventive Work. The head of the family is dealt with, whenever possible. The children who ask for assistance on behalf of parents are told that the parents must come in person. The child must not form the begging habit. All workers will testify to the value of preventive efforts on behalf of the children. Summer camps, home libraries, local associations, mother's meetings, penny savings banks, are among the forms this work assumes.

It will be seen from the foregoing that the work of the Charity Organization Society is to an unusual degree administrative—personal. This is the secret of the great work it is able to do, but is frequently a cause of complaint to those who do not grasp the situation. Personal service is considered the highest form of giving. A large part of the income of the Charity Organization Society is therefore spent in salaries. The complexity of the organization naturally increases with the size of the city. There is a board of directors chosen from among those who contribute to the society, and under the directors an executive committee. The administrative officer is the superintendent, who has his necessary assistants. The larger cities are divided into districts, each in charge of a district superintendent, who is responsible for the work in the district. Applicants for help are referred to the district in which they live. The central and district offices are open daily. The central office keeps on file a digest of all cases from each district. In each district a "decisions committee" meets weekly to discuss the various cases and decide upon courses of action. The funds come from private donors.

Expert Service. The work of the Charity Organization Society calls for educated and trained men and women. The mere desire to do good is no qualification, nor is charitable work in general any longer a dumping ground for those who have failed in other professions. The highest abilities are sought, and some societies are conducting special schools for portions of the year for the training of workers.

Publications. The best American periodical devoted to charities is the *Survey* (formerly *Charities and the Commons*), published in New York City. In England this place is filled by the *Charity Organization Review* of the London Society. Consult: Loch, *Charity Organization* (London, 1890); Warner, *American Charities* (New York, 1894); Devine, *The Practice of Charity* (New York, 1901); id., *Principles of Relief* (New York, 1904); Henderson, *Modern Methods of Charity* (New York, 1904); Brandt, *The Charity Organization Society of the City of New York* (New York, 1907); *Reports of Societies* (Boston, New York, Philadelphia, etc.). See PAUPERISM; SOCIAL-DEBTOR CLASSES.

CHARIVARI, shä'rē'vä'rē' (LL. *charivarium*). A French term used to designate a wild tumult and uproar, produced by the beating of pans, kettles, and dishes, mingled with whistling, bawling, groans, and hisses, and got up for the purpose of expressing a general dislike to the person against whom it is directed. The etymology of *charivari* is obscure; the Germans translate it by *Katzenmusik*, the English of which is *caterwauling*. In France, during the Middle Ages, a charivari was generally raised against persons contracting second nuptials, in which case the widow was especially assailed. On these occasions the participators in it, who were masked, accompanied their hubbub by the singing of satirical and indecent verses and would not cease till the wedding couple had purchased their peace by ransom. It was also organized against an unequal match, e.g., where there was great disparity in age. In some of the rural districts of the United States a like custom prevails, the instruments of discord being horns, tin pans, horse fiddles, and whistles. The rustic American corruption of the word "charivari" is "shiveree," for which a synonym is "skimmerton." Similar customs seem to have existed under different names in all parts of Europe, and sometimes they were of such a licentious and violent character as to require military interference to put them down. Even as early as the fourteenth century the Church found itself forced to threaten punishment, and even excommunication, against those who participated in them. In more recent times the charivari has taken a purely political coloring; as, e.g., during the Restoration in France, at which time, however, the popular voice began to seek vent by casting its satirical darts against public men through the press. Among the papers of this sort the most famous is the *Charivari*, established in Paris, Dec. 2, 1832, on which was patterned the English publication *Punch* (q.v.).

CHARKOV, kär'kôv. See KHARKOV.

CHARLEMAGNE, shär'le-mān, *Fr. pron.* shär'l'-mä'ny'. See CHARLES THE GREAT.

CHARLEMAGNE CYCLE OF ROMANCES. A division of one of the three principal cycles of romances which took form in France in the thirteenth century. These three cycles may roughly be designated as the *gestes royales*, the *gestes de Guillaume*, and the *gestes de Doon de Mayence*. The first of these divisions was composed of all the poems which had been written about the three regal historic figures Pepin, Charles, and Louis, and the *Charlemagne Cycle* was composed exclusively of all those poems which centred about the life and court of the second of these characters. It consisted of a collection and arrangement made by certain itinerant musicians, who were editorially minded, of whatever of the ancient *chansons de geste* pertained particularly to the deeds of this one hero. Many of these chansons were founded on certain heroic ballads which Charlemagne himself had caused to be preserved in writing. These had already formed the basis of two Latin chronicle histories by a monk of St. Gall (890), and by Benedict of St. André (968), entitled *De Gestis Caroli Magni;* and the two latter works were doubtless of great aid to the thirteenth century codifiers of the *gestes*. The cycle is composed of the following individual narrative poems: *Fierabras; Garin de Montglane; Gallien le Rhetoré; Ogier le Danois; Les Quatres Filz Aymon,* and others of varying dates. A prose version of it, in French, was printed at Bagnyon in 1478. Consult G. Paris, *Histoire poétique de Charlemagne* (Paris, 1865).

CHARLEROI, shär'l'rwä' (Fr., Charles king). A Belgian town and railroad centre in the Province of Hainaut, situated on the Sambre and on the Charleroi Canal, between Mons and Namur (Map: Belgium, C 4). It has an archæological museum, with a mineralogical collection and an industrial school, and is altogether dependent upon the activities of the surrounding region. The district is rich in coal and iron, and there are a number of smelting furnaces and nail factories in the neighborhood. The iron works of Couillet, which yield a third of all the cast iron produced in Belgium, are near by. It also produces machinery, glass, and cutlery. Pop., 1890, 21,900; 1900, 24,800; 1910, 27,396. In 1666 the village, originally Charnoi, was fortified by the Spaniards and named, in honor of the King, Charles II, Charleroi.

CHARLEROI, shär'le-roi'. A borough in Washington Co., Pa., 40 miles south of Pittsburgh, on the Monongahela River, and on the Pennsylvania Railroad (Map: Pennsylvania, B 7).

Industries include mining and the manufacturing of various kinds of glass and shovels. Charleroi was settled in 1890 and incorporated in the following year. The government is vested in a burgess, elected every four years, and a borough council, chosen on a general ticket. Pop., 1900, 5930; 1910, 9615. Charleroi is the home of John K. Tener, former Governor of Pennsylvania.

CHARLES THE GREAT, or **CHARLEMAGNE** (from Lat. *Carolus Magnus*, Charles the Great) (742–814). King of the Franks after 768, and Roman Emperor from 800 to 814. He was the son of Pepin the Short, the first Carolingian King, and of Bertha, a daughter of Charibert, Count of Laon, and was born probably on April 2, 742. His birthplace is unknown; but from the fondness which he displayed throughout his life for the cities of Aix-la-Chapelle and Ingelheim, it has been conjectured that he was born in one of these places. Of his early youth and education nothing is known, even from Einhard, his contemporary biographer. He was brought up at the court of his father and received the thorough military training which constituted the education of the time. He took part in his father's expeditions against Aquitaine in 761 and 762. On Pepin's death, in 768, the Frankish Kingdom was divided between his two sons, Charles receiving the eastern part, or Austrasia, which was predominantly Germanic, together with a part of Aquitaine, while his brother Carloman received Neustria, the Romance part of the Frankish domains. Carloman died in 771, and Charles, with the consent of the Frankish nobles, took possession of the entire kingdom, to the exclusion of the young sons of his brother. Their mother fled to Desiderius, King of the Lombards, and the ensuing complications led to the first great war of Charles's reign. Charles had, ere this, in 770, offended Desiderius by repudiating his second wife, Desiderata, who was that monarch's daughter. The latter therefore received Carloman's widow hospitably, and urged Pope Adrian I to crown the sons of Carloman. Upon the Pope's refusal he invaded the papal territory. The Pope thereupon summoned the Frankish King to his aid. Charles endeavored to avert the war; but upon the refusal of Desiderius to restore the papal cities of the Pentapolis, he crossed the Alps, with two armies, from Geneva by the Great St. Bernard and Mont Cenis, in 773, and besieged Desiderius in Pavia, forcing him after a 10 months' siege to surrender and retire to a monastery. In 774 he proclaimed himself King of the Lombards and was acknowledged as such by the Lombard dukes. He secured the Pope's favor by confirming the donation of lands made to the holy see by Pepin. In the winter of 776 he again crossed the Alps and crushed a Lombard revolt, henceforth ruling over northern and central Italy as far south as Spoleto. In 780 he went to Italy, where the Pope crowned his second son, Pepin, King of Italy, and his third son, Louis, an infant, three years old, King of Aquitaine. In 787 he completed the conquest of the Lombards by the subjugation of the Duke of Beneventum.

The severest war undertaken by Charles was his contest with the Saxons. The struggle was of long standing, having been waged by his father and grandfather, and contemplated the incorporation of the Saxons into the Frankish Kingdom and their conversion to Christianity. The obstinate resistance of the Saxons has scarcely been equaled in history. In 772 Charles advanced as far as the Weser and destroyed the famous "Irminsul"—according to heathen belief, the column supporting the earth. There were incessant revolts, but in 775 Charles carried his arms as far as the Elbe. In 777 he could even hold the Frankish National Assembly on Saxon soil, at Paderborn. But in 778, on news of Charles's absence in Spain, the Saxons again arose and advanced almost to Cologne; but Charles again drove them back to the Elbe. They destroyed a Frankish army in the Süntel Highlands in 782; and Charles, after a new victory, avenged this disaster by the massacre, at Verden, of 4500 prisoners in one day. This caused a general rising of the Saxons, but in 783–785 the Frankish monarch at last succeeded in reducing them to subjection. Their great leader, Widukind, submitted to baptism, and their principal chiefs became Charles's vassals. The Saxons north of the Elbe submitted in 804, and 10,000 of them were led into the interior of Germany as hostages. Charles proceeded to extend his arms beyond the boundaries of Saxony. The neighboring Slavs were either his allies or else were made tributary, and even the Bohemians were in part subdued. The Danes were confined to the north of the Eider, which became the northern boundary of Charles's kingdom.

Charles was equally successful in the southeast. His marriage, in 771, with Hildegarde, daughter of Duke Godfrey of Suabia, secured his influence in that duchy. In Bavaria his cousin, Tassilo, ruled practically as an independent sovereign. He had been allied with the Lombards, but in 781 he took the oath of allegiance to Charles. In 787 he rebelled, but was forced to surrender, and was deposed in 788. Tassilo had also been allied with the Avars, a fierce nomadic tribe which occupied the great plain of the middle Danube. The wars which Charles undertook against them in 791–796 resulted in the entire destruction of the nation, the Raab becoming the southeastern boundary of the Frankish Kingdom. In 778, at the invitation of the Emir of Saragossa, who was in revolt against his suzerain, the Caliph of Córdova, Charles invaded northeastern Spain. This campaign against the infidel figures very prominently in mediæval legends, but in reality it was without direct result. Charles was summoned home by the news of a Saxon revolt, and in his return over the Pyrenees, the rear guard of his army was assailed and annihilated, probably in the Pass of Roncesvalles, by the Basques. In this battle Roland, afterward the hero of a vast legendary literature, fell. In 779 Charles sent his son Louis to Spain, and after the fall of Barcelona he established the Spanish "mark," extending from the Pyrenees to the Ebro. It was the policy of Charles to establish such marks on the borders of his dominions as bulwarks against the uncivilized nations by which they were surrounded. Against the Danes he established the Danish mark south of the Eider; against the Sorabians the Thuringian mark; against the Bohemians the Frankish mark; and against the Southern Slavs the marks of Carinthia and Friuli. The land in these districts was parceled out among Frankish vassals, and the margraves who ruled over them had far greater power than the ordinary counts. Charles also made use of the Church to secure his conquests. In the Saxon

wars the Saxons were baptized by the thousands, and the bishoprics of Halberstadt, Paderborn, Minden, Verden, Bremen, Münster, and Osnabrück were erected. He also founded great monasteries, like Corvey and Herford, which were in fact fortresses in the enemy's country.

By the conquest, organization, and rule of such extensive dominions and of peoples so different in race and political tradition, Charles had virtually established an empire. His assumption of the Imperial title and the revival of the Western Roman Empire were but the logical consummation of his great work. This event took place on the occasion of an expedition to Italy, the object of which was to support Pope Leo III against the rebellious Romans. While Charles was worshiping in St. Peter's on Christmas Day, 800, the Pope unexpectedly, as it appeared, set a crown upon his head, and amid the acclamations of the people saluted him as "Carolus Augustus, Emperor of the Romans." Whether or not the Emperor was aware of the intention of the Pope is a matter of conjecture only. In his familiar conversations he was wont to protest his ignorance of the projected coronation. In itself it added nothing directly to Charles's power, yet it greatly confirmed and increased the respect entertained for him, such was the lustre of a title with which were associated recollections of all the greatness of the Roman Empire. There is said to have been a scheme for the union of the newly revived Western Empire with the Empire of the East, by Charles's marriage with Irene, the Byzantine Empress. If so, it failed by reason of Irene's overthrow. Besides the moral weight of Roman tradition, the Imperial title added to Charles's office of King the powerful temporal guardianship of the Church. This was strongly emphasized in the new oath of allegiance to him, as Emperor, which Charles caused all his subjects to swear in 802. He proceeded to organize the Empire with a view to strengthening the Imperial power. The old national dukedoms having been abolished, Charles governed his dominions through counts, whom he himself appointed. Each count presided over an ancient canton (*Gau*), a subdivision of the dukedom. Three times a year the count held a regular court, which all freemen were bound to attend, and in times of war he assembled the military levy of the Gau. To watch over the counts Charles sent his "Missi Dominici," usually a count and a bishop, to the extreme ends of the Empire. Their functions were to look after the administration of the Church, to collect the Emperor's revenues, and hold the superior court. Charles did not attempt to interfere with local Germanic institutions, but caused the ancient laws to be codified and reduced to writing. Although his rule was in fact absolute, he retained the ancient national assemblies, which every freeman might attend. They met twice a year, in spring (*Maifeld;* see CHAMP DE MAI) and in autumn, and decided upon matters of state, particularly on peace and war. Here the "Missi Dominici" made their reports, and the Church councils were held. Besides the "Missi" (q.v.) and his councilors, there were two chief court officials—the Apocrisiarius, who stood at the head of Church affairs, and the Count Palatine (Comes Palatinus), who presided over the secular administration. The income from the royal domains, which Charles skillfully managed, together with the revenues from the administration of justice and so-called free-will offerings, provided for the expenses of the state.

Charles promoted to the fullest extent the interests of the Church. He recognized in it a powerful ally, both in increasing and ruling his dominions. His wars were religious as well as political; he introduced Christianity into the countries which he conquered. He made the system of tithes compulsory throughout the Empire, and richly endowed bishoprics and monasteries. His zealous coöperation with the bishops in bringing about disciplinary reform, his always active interest in doctrinal matters and solicitous participation in the national synods, contributed wonderfully to increase the power and influence of the Church. No sovereign in the history of Christendom contributed more actively and efficaciously than Charles to the propagation and strengthening of religion and the upbuilding of the Church, though the revival of the Western Empire in his person led eventually to the memorable conflict, which filled subsequent centuries, between papacy and the Empire. He also effected a closer Church organization, by subordinating more strictly the bishoprics to the archbishoprics and by strengthening the hold of the Bishop over the churches of his diocese.

No less glorious than his political achievements was the revival of science, literature, and art which Charles brought about—a renaissance all the brighter for the gloom by which it was preceded and followed. He summoned to his court the greatest scholars of the age: Alcuin, the Englishman, who became the head of the Palace School; Paulus Diaconus, the Lombard, who wrote a history of his people; Peter of Pisa, the grammarian; Angilbert and Theodulf, the greatest poets of the day, who wrote in imitation of the ancient authors; finally, Einhard, Charles's secretary and friend. In this circle of scholars Charles moved as a comrade and friend, much as did Lorenzo de' Medici in the Platonic Academy of Florence. He himself possessed an amount of learning unusual in his age, in spite of the fact that he could not write, having begun to learn too late in life. He was very fond of his native tongue—the Frankish—and is said to have drawn up a grammar of the language. He invented Frankish names for the months of the year and for the winds and caused a collection of old German poems and legends, then current, to be made, which his pious son Louis is said to have destroyed because of its heathenism. In his Palace School his own sons and those of the nobility received a liberal education; but he also commanded that each cathedral and monastery should have a school to which laymen, as well as clergy, should be admitted. The school which Alcuin established at Tours, under his patronage, was famous for centuries. He also attempted to establish public schools for all freemen in connection with the monasteries and parishes. He was no less liberal in his patronage of the fine arts. He built palaces, particularly at his favorite residences, Aix-la-Chapelle and Ingelheim—for he had no fixed capital—and many churches, chief among which was the minster of Aix. He endeavored zealously to promote agriculture, manufactures, and commerce. He projected great national works, one of which was a canal to connect the Rhine and the Danube; but he deemed nothing beneath his attention which concerned the interests of his Empire or of his people. He re-

quired his subjects to plant certain kinds of fruit trees, the cultivation of which was thus extended northward in Europe. His own domains were an example of superior cultivation.

Charles the Great was one of the most imposing figures, not only of the Middle Ages, but of all history. His personality impressed itself upon the imagination of the people of the Middle Ages as that of no other man has done. Romances and legends grew up around his name and those of his nobles, or paladins. According to contemporary accounts, he was above the ordinary stature and of a noble and commanding presence. He was fond of manly exercises, particularly of hunting, and his strength was prodigious. His mode of life was simple. In eating and drinking he was very moderate. He wore the simple, ancient costume of his people, except on great state occasions, when he used Roman robes and ceremonial. His death took place on Jan. 28, 814. He was buried in the minster of Aix and was succeeded by his son Louis, known as the Pious.

Bibliography. Besides his capitularies (q.v.), there are extant letters and Latin poems ascribed to Charles the Great. Consult Dümmler, *Poetæ Latini Ævi Carolini* (Leipzig, 1881–84). The chief source for his history is the biography, by his secretary, Einhard, *Viti Caroli Magni*, edited by Pertz, in the *Monumenta Germaniæ Historica*, and separately (Hanover), 1863; Eng. trans. by Glaister, London, 1877). Other sources are the letters and poems of Alcuin, Paulus Diaconus, and Angilbert, and the contemporary annals, for a description and editions of which consult Wattenbach, *Deutschlands Geschichtsquellen im Mittelalter*, vol. i (Berlin, 1904). The most detailed modern account of his reign is Abel and Von Simson, *Jahrbücher des frankischen Reiches unter Karl dem Grossen* (Leipzig, 1883; 1888). Consult also: Vétault, *Charlemagne* (Tours, 1876); Döllinger, *Das Kaisertum Karls des Grossen und seiner Nachfolger* (Munich, 1864); Haureau, *Charlemagne et son cour* (Paris, 1888). The best English works on Charles are: *The Cambridge Medieval History*, vol. ii (New York, 1913); Mombert, *History of Charles the Great* (New York, 1888); Hodgkin, *Charles the Great* (London, 1897); Davis, *Charlemagne*, in "Heroes of the Nations Series" (New York, 1900); and Prutz, *Age of Charlemagne* (Philadelphia, 1905); consult also: Clemen, *Die Portratdarstellungen Karls des Grossen* (Aachen, 1890).

CHARLES II. Holy Roman Emperor. See CHARLES I, THE BALD, King of France.

CHARLES III. Holy Roman Emperor. See CHARLES II, THE FAT, King of France.

CHARLES IV (1316–78). Holy Roman Emperor from 1355 to 1378. He was born at Prague, May 14, 1316, and was the son and successor of John of Luxemburg, King of Bohemia, who fell in the battle of Crécy in 1346. With the aid of Pope Clement VI, to whom he had previously taken an oath sacrificing several Imperial prerogatives, he was elected King of Germany by five electors on July 11, 1346. This was done because the Emperor Louis IV, who, as such, was also King of Germany, had been placed under the greater excommunication by the Pope. Charles and Louis contended for the prize until the death of the latter in 1347. On Easter Day, 1355, Charles IV was crowned Emperor at Rome. In 1356 he issued the Golden Bull, establishing a new rule for the election of the King of the Romans. On June 4, 1365, he was crowned King of Arles. In 1376 he had his son, Wenceslaus, elected King of the Romans, to succeed him after his death, and secured the Pope's confirmation of the election, in spite of the provisions of the Golden Bull. He died at Prague, Nov. 29, 1378. Charles was an artful politician and directed his efforts mainly to securing power for his own family and for his hereditary Kingdom of Bohemia, which was very flourishing under his reign. He, with the Archbishop of Prague, founded the University of Prague, on the model of that of Paris, in 1348. For his early years, till 1346, we have an autobiography, "Vita Caroli IV ab ipso conscripta," in Boehmer, *Fontes rerum Germanicarum*, vol. i (Leipzig, 1885). Consult Wernusky, *Geschichte Kaiser Karls IV und seiner Zeit* (Innsbruck, 1880–92).

CHARLES V (1500–58). Holy Roman Emperor and, under the title of Charles I, King of Spain. He was born at Ghent, Feb. 24, 1500, and was the eldest son of Philip, Archduke of Austria, and Joanna, the daughter of Ferdinand and Isabella of Spain. Philip's parents were the Emperor Maximilian and Mary, daughter and heiress of Charles the Bold, Duke of Burgundy. On the death of his father in 1506, Charles, at the age of six, inherited the Burgundian realm, consisting in the main of the rich and populous provinces of the Netherlands, then at the height of their prosperity. On the death of his grandfather, Ferdinand, in 1516, he became King of Spain, as his mother, Joanna, was of disordered intellect and incapable of reigning. To the Spanish crown belonged Naples, Sicily, and Sardinia; the Spaniards were just entering upon their great career of conquest in the New World. Charles was not very favorably received by the Spanish nobles, who were doubtful of his rights and jealous of the followers whom he brought from Flanders, where he had been educated. The repression of the liberties of the people, which had already gone far under his grandfather, and which his son was to reduce to a system, continued unchecked under Charles, in spite of the appeals of the Cortes. All the abilities of his famous minister, Cardinal Ximenes, were requisite to prevent an open rupture. In the early part of his reign (1520) the towns of Castile were driven to revolt for the maintenance of their ancient liberties. It was with difficulty that the insurrection was put down (1521). (See PADILLA, JUAN DE.) On the death of his grandfather, Maximilian, in 1519, Charles conjointly with his younger brother, Ferdinand, succeeded to the possession of the hereditary dominions of the house of Hapsburg (house of Austria). On June 28, 1519, he was raised to the Imperial throne of Germany by the choice of the electors, the rival candidates being Francis I of France and Henry VIII of England, and was crowned at Aix-la-Chapelle, Oct. 23, 1520. Owing to the jealousy of his Spanish connections, he was required to sign an election agreement (*Wahlkapitulation*) guaranteeing certain rights to the German nation—a practice followed by his successors in the Imperial office. Charles was now by far the most powerful sovereign in Christendom. In his earlier years he had been frivolous and dissolute, but he now became mindful of the duties and dignity of his high position. He ascended the Imperial throne at a time when Germany was in a state of un-

precedented agitation, because of the movement set on foot by Luther. To restore tranquillity, a great diet was held at Worms in 1521, before which Luther made the memorable defense of his doctrines. Just at this moment the great struggle between France and Spain broke out afresh, Francis I taking up arms against his rival, whose attention was drawn away from the internal affairs of Germany. Thus, instead of vigorously assailing the Protestant movement when it might still have been in his power to quell it, Charles, who was not alive to its significance, permitted it to take deep root.

The war between Charles and Francis, in which the former had Henry VIII of England as an ally, and was strengthened by the defection of the powerful Charles of Bourbon, proved disastrous to France. The French were swept out of Lombardy, and in an attempt to regain possession of it Francis was defeated before the walls of Pavia, Feb. 24, 1525, and taken prisoner. He was forced to sign a humiliating treaty at Madrid, January, 1526; but hardly had he been set at liberty when he prepared to renew the struggle, with Henry VIII now on his side and with the support of Pope Clement VII, of the house of Medici, who, alarmed at the victories of Charles, was anxious to rid Italy of the Imperialists and induced some of the Italian states to join him. The Emperor's forces, under Frundsberg and Charles of Bourbon, took Rome itself by storm (1527), plundered it, and made the Pope a prisoner. Charles pretended great regret, went into mourning with all his court, and caused prayers to be said for the Pope's liberation, while by his own direction the Pope was kept for seven months a captive. The Peace of Cambrai, between Charles and Francis, in 1529, deprived France of Lombardy, for the possession of which she had fought so furiously. In 1530 Clement VII, into whose scheme for the restoration of the Medici in Florence Charles had entered, crowned the victorious monarch at Bologna as King of Lombardy and Emperor of the Romans (the last coronation of a German emperor by the Pope). Simultaneously with these events a great drama was being enacted in the basin of the Danube, which brought a still greater concentration of power in the hands of the Hapsburg dynasty. In 1526 the Ottoman Sultan, Solyman the Magnificent, laid low the power of Hungary in the battle of Mohács. The Hungarian monarch, Louis II, who was also King of Bohemia, did not survive the defeat, and Ferdinand of Hapsburg, his brother-in-law, was chosen his successor in Bohemia, while some of the nobles in Hungary also conferred upon him the royal crown. Thus were laid the foundations of the modern Hapsburg monarchy of Austria-Hungary. Previous to this, in 1521–22, Charles had relinquished to Ferdinand the sole sovereignty over the principal portion of the old hereditary Austrian dominions. Having made peace with his formidable rival, Charles now thought to put an end to the religious differences in Germany and to repel the Turks, who had overrun Hungary and laid siege to Vienna. But the Diet at Augsburg, in 1530, proved how vain was the hope of restoring the former state of things in Germany; and when the Emperor refused to recognize the confession of the Protestants (see AUGSBURG CONFESSION), they refused to help him against the Turks. In 1531 the Protestant princes formed the League of Schmalkald (q.v.) and allied themselves with France and England for their own protection. This, and the continued assaults of the Turks, compelled the Emperor to yield in some measure to the demands of the Protestants and to conclude the Peace of Nuremberg (1532). In 1535 Charles undertook an expedition from Spain against the pirate Barbarossa, who had established himself in Tunis, and whose vessels did great injury to the commerce of Spain and Italy. In this expedition he was completely successful and set free no fewer than 22,000 Christians who had been held as slaves. War again broke out with France. An armistice for 10 years was concluded at Nice in 1538, which left the bulk of the dominions of the despoiled Duke of Savoy in the hands of Francis. Charles visited Paris, where he was magnificently entertained. In 1540 the proud city of Ghent, the birthplace of the Emperor, received a terrible chastisement at his hands for daring to resist his mandates. In 1541 Charles undertook an expedition against Algiers, but returned discomfited. In 1542–44 he was engaged in a fresh war with France, Henry VIII being once more his ally. It was terminated by the Treaty of Crespy, advantageous to the Emperor. The suspension of the struggle with France left the Emperor at liberty to turn his arms against the Protestants of Germany, at whose head were Philip the Magnanimous, Landgrave of Hesse, and John Frederick, Elector of Saxony. Charles received the support of the ambitious Protestant Prince Maurice, Duke of Saxony (of the Albertine line). The victory of Mühlberg, April 24, 1547, placed the Protestants at the mercy of Charles, who deprived John Frederick of his territories. In 1548 the Augsburg Interim was published, fixing the degree of religious toleration to be accorded in Germany pending the decision of the Council of Trent, which had been opened in 1545. In 1551 Magdeburg, a great stronghold of Protestantism, succumbed to the arms of Maurice of Saxony. But this Prince himself now became thoroughly alarmed at the arbitrary manner in which the Emperor was proceeding to carry out his political aims, and suddenly turned his arms against him, allying himself with Henry II of France. Charles was compelled to flee before the arms of the Protestants, and in 1552, through his brother Ferdinand, he concluded with them the Peace of Passau, by which the Lutheran states were allowed the exercise of their religion. A more definite settlement was made, in the Peace of Augsburg, in 1555. In the meanwhile Henry II seized the three bishoprics of Toul, Metz, and Verdun (1552), and an attempt of the Emperor to reconquer Metz failed miserably.

Weary of the constant struggles and heavy responsibilities of his ill-assorted realms, Charles now declared his resolution to seek repose and devote the remainder of his days to God. In 1555–56 he resigned the Netherlands and Spain to his son Philip, and in 1557 abdicated the Imperial crown in favor of his brother Ferdinand and retired to the monastery of Yuste, in Estremadura. At Yuste Charles spent two years, partly in mechanical pursuits, partly in religious exercises, which are said to have assumed a character of the most rigid asceticism, and partly in active participation in politics. He died Sept. 21, 1558. By his wife, Isabella, daughter of King Emmanuel of Portugal, he had one son, his successor, Philip II of Spain,

and two daughters. Charles V was a prince of remarkable executive powers. He showed a shrewd and sometimes statesman-like ability in meeting the difficult problems of his reign; but this gave way more and more to the religious temperament inherited from the Spanish side of his house. While he spared his Protestant subjects in Germany for political reasons, he persecuted heresy unsparingly in Spain, where policy imposed upon him no restraint. As a general he ranks high. In temperament and disposition he was cold, phlegmatic, stoical, and devoid of chivalry.

Consult: W. Robertson, *History of the Reign of Charles V* (London, 1886); Baumgarten, *Geschichte Karls V* (3 vols., Stuttgart, 1885–92); Lanz, *Korrespondenz des Kaisers Karl V* (Leipzig, 1844–46); Sandoval, *Historia de la vida y hechos del Emperador Carlos V* (Valladolid, 1604); Sepulveda, *De Rebus Gestis Caroli V* (Madrid, 1780); Ranke, *Deutsche Geschichte im Zeitalter der Reformation* (Leipzig, 1894); Armstrong, *The Emperor Charles V* (2 vols., London, 1902).

CHARLES VI (1685–1740). Holy Roman Emperor from 1711 to 1740, and the last of the direct male line of the house of Hapsburg. He was the second son of the Emperor Leopold I and was born Oct. 1, 1685. His father wished to secure for him the crown of Spain; but Charles II of Spain assigned it by testament to Philip of Anjou, whereupon arose the great War of the Spanish Succession, Britain and Holland taking part with the Emperor against France, for the maintenance of the balance of power in Europe. (See SUCCESSION WARS.) Charles was acknowledged by the allies as Charles III of Spain, but had not succeeded in obtaining permanent possession of the kingdom when the death of his brother, the Emperor Joseph I, recalled him to Germany in 1711; and as he now became Emperor of Germany, England and Holland concluded the Peace of Utrecht with France in 1713, not wishing to see him also King of Spain. Charles continued the war for some time, but by the Peace of Rastadt (1714) gave up his claim to Spain, being confirmed, however, in possession of the Spanish Netherlands and of the Spanish possessions in Italy. He was successful in a war against the Turks, marked by splendid Austrian victories under Prince Eugene and concluded by the Treaty of Passarowitz (1718), and in a war with Spain, which arose out of the project of the Spanish Minister, Alberoni (q.v.), and in which the Quadruple Alliance was formed—France, England, and Holland joining the Emperor against Spain. Charles had lost his only son and, being anxious to secure the throne to his own descendants, named his daughter, Maria Theresa, as his heiress, by a Pragmatic Sanction, which he began to prepare as early as 1713. For more than 20 years the foreign policy of Charles was dictated by the sole desire of obtaining the ratification of the Pragmatic Sanction from the European Powers. To accomplish this he sacrificed Austrian territories in Italy and Spain, and the commercial prosperity of Flanders to England and Holland. (See OSTEND COMPANY.) He won over Prussia by the concession of extensive privileges and bribed Russia by allowing it a free hand in Poland. He was unsuccessful in the so-called War of the Polish Succession, waged against France and Spain, in the course of which Don Carlos conquered the Two Sicilies in 1734–45. He was also worsted in a second war with the Turks, terminated by the Peace of Belgrade in 1739, in which Austria made some cessions of territory. He died Oct. 20, 1740. He was of a mild and benevolent disposition, but full of superstition and conservative prejudices. Consult Mailáth, *Geschichte des österreichischen Kaiserstaates* (Hamburg, 1834–50), and Coxe, *History of the House of Austria*, vol. iii (3d ed., London, 1873). See HAPSBURG, HOUSE OF.

CHARLES VII (1697–1745). Holy Roman Emperor from 1742 to 1745. He was the son of Maximilian Emanuel, Elector of Bavaria, and for some time Governor of the Spanish Netherlands. After the conquest of the Bavarian territories, and the pronunciation of the ban of the Empire against his father by the Emperor Joseph I (see SUCCESSION WARS), he was for some time a prisoner; but after the death of Joseph, Charles married the latter's youngest daughter and in 1726 succeeded his father as Elector of Bavaria, as such styled Charles Albert. He refused his consent to the Pragmatic Sanction and, on the death of Charles VI, in 1740, advanced a claim to the Austrian dominions in right of his wife and upon the further ground of a testament of Ferdinand I. At first he was successful with the aid of the French forces and caused himself to be proclaimed Archduke of Austria at Linz and King of Bohemia at Prague. In 1742 he was elected Emperor. The Hungarians, however, rose in favor of Maria Theresa, and he was driven from Austria and from Bohemia and for a time even from his Bavarian capital, Munich. Disease and calamities combined to cause his death, Jan. 20, 1745. "Misfortune," he said, "will never leave me till I leave it." Consult Arneth, *Geschichte Maria Theresias* (Vienna, 1863–1879), and Heigel, *Der oesterreichische Erfolgestreit und die Kaiserwahl Karls VII* (Munich, 1877).

CHARLES I (1600–49). King of England, Scotland, and Ireland from 1625 to 1649. The second son of James I of England and VI of Scotland, he was born at Dunfermline, Nov. 19, 1600, and created Duke of Albany at his baptism, December 23. He was a delicate child, tongue-tied, and troubled with weak joints and ankles. In 1605 he was created Duke of York and on the death of his brother Henry, Nov. 6, 1612, became heir apparent, but was not created Prince of Wales until Nov. 3, 1616. He outgrew his physical defects, with the exception of a slight stutter; became a diligent theological student, an accomplished scholar, and skillful in the sports of tilting, tennis, and marksmanship. At 22 years of age he had developed artistic and musical tastes and was distinguished for modesty of conduct and morals. Negotiations for his marriage were made, first with Princess Christian, sister of Louis XIII of France, in 1613, and then with the Infanta Maria of Spain, daughter of Philip III in 1614. In February, 1623, occurred his journey to Spain, at the suggestion of his favorite companion, Buckingham, who accompanied him. Unannounced, he arrived in Madrid, to the consternation of the Spanish statesmen, who had already decided against the marriage. After much duplicity on both sides Charles returned to England in October, being received with popular acclamation. Negotiations were broken off on religious pretexts, although the unwillingness of Philip to help in the restoration of Charles's

brother-in-law, Frederick, to the Palatinate was the real cause. Charles aroused national enthusiasm by advocating war and expressed his readiness to conquer Spain; but his father wished for a military expedition to the Palatinate. On March 27, 1625, James died, and Charles succeeded to the throne. To gain France as an ally, on May 1 he married, by proxy, Princess Henriette Marie, of France (1609–69), receiving his bride at Canterbury on June 13. The national admiration was quenched by this marriage, with its accompanying violations of parliamentary anti-Roman pledges; and before a year had elapsed Charles, finding the Queen's Roman Catholic retinue of 440 persons too troublesome, deported them to France. His marriage subsequently proved particularly happy. His reign, however, was doomed to failure. He was a puppet in the hands of his favorite, Buckingham, whom he had appointed Prime Minister in defiance of public wishes and whose warlike schemes ended ignominiously. Three parliaments, convoked in four years, were dissolved in royal exasperation at their refusal to comply with his arbitrary measures, and public feeling became embittered. The third Parliament presented the *Petition of Right* (q.v.) in 1628. The King temporized and conceded, then—although Buckingham's assassination had removed one cause of the contention—dissolved Parliament and caused some of the leading members to be imprisoned, one of whom, Sir John Eliot, was allowed to sicken and die in the Tower, although he presented several petitions for a temporary release. Influenced by the Queen, and with Laud and Wentworth as chief advisers, Charles governed without a Parliament for 11 years, the despotic Star Chamber and High Commission courts giving semblance of legal sanction to forced loans, poundage, tonnage, ship money, and other extraordinary measures to meet governmental expenses. Republican principles developed and expanded, towards which Charles opposed a policy of severe repression. His attempt to impose episcopacy provoked the Scotch to restore Presbyterianism and to adopt the Solemn League and Covenant, Feb. 28, 1638. In 1639 Charles assembled an army to enforce his will; the Covenanters retaliated and advanced to the border. Unable to proceed without supplies, in 1640 Charles summoned the "Short Parliament," which he dissolved in three weeks, as the members refused to listen to his demands, but drew up a statement of public grievances, demanded an inquiry into Eliot's death, and insisted on peace with Scotland. Obtaining money by irregular means, Charles advanced against the Scots, who crossed the border and defeated his army at Newburn-upon-Tyne, and soon afterward occupied Newcastle and Durham, everywhere receiving popular sympathy and support. His money exhausted, the King was compelled to call the "Long Parliament" which met Nov. 3, 1640. Led by the ripe, sagacious, and dauntless Pym, it proceeded to redress grievances and showed its resolution by impeaching and imprisoning the instigators of royal despotism, Laud, and Wentworth, who had been created Earl of Strafford. The peers, before whom Strafford was tried, refused to condemn him, but a luckless plot, of which Charles probably knew almost nothing, to overcome Parliament by military force sealed the fate of the ministers. A bill of attainder was passed, and Charles, in trepidation for the life of his Queen, which he considered in danger from mob violence, signed Strafford's death warrant and confirmed a bill by which Parliament was not to be dissolved without its own consent. The King was now pledged to constitutional rules, but unhappily was imbued with extreme notions of kingly prerogative. He visited Scotland, hoping by concessions to win favor and armed support; but while there the Irish Rebellion and Ulster Massacre occurred, and, suspecting that Charles had intrigued for the military assistance of the Irish Catholic lords, Parliament enlarged its demands. The Commons accepted a petition against the royally appointed bishops who disputed their authority, and who were mobbed on their way to the House of Lords.

On his return from Scotland the King had yielded to the provisions of "The Grand Remonstrance"; but now, learning of the impending impeachment of his Queen, who had sought assistance from Rome, he appeared in the Commons with an armed force and, accusing Pym, Hampden, Hollis, Haselrig, and Strode of treason, demanded their arrest and delivery to him.

Intense excitement ensued; shouts of "Privilege of Parliament" were raised; the indicted members, forewarned, had taken refuge in the city, and the King retired with undignified threats. The country was aroused, Parliament and the nation were declared in peril, and London prepared to defend itself. Met with his own weapons, the alarmed King fled with his family to Hampton Court. Seven months later he raised the royal standard at Nottingham, Aug. 22, 1642, and civil war commenced and proceeded, although arbitration was vainly attempted from time to time. The Royalists at first were the victors; but after several reverses the parliamentary forces acquired experience and discipline, and Cromwell and Fairfax annihilated the royal army at Naseby, June 14, 1645. Guerrilla warfare continued until Charles gave himself up to the Scottish army at Newark, on May 5, 1646. Negotiations were fruitlessly renewed, and he was delivered to the English Parliament, who assigned him a residence at Holmby House, near Northampton. After four months his qualified reply to a parliamentary proposal resulted in his conveyance by Cornet Joyce to Hampton Court. He continued his intrigues and opposition to all constitutional propositions, and after three months escaped to the Isle of Wight, where he hoped to receive aid from the governor of Carisbrooke Castle, but was imprisoned. Cromwell and the Independents lost patience and compelled Parliament to pass an act of treason against further negotiation with the King, who was removed to Hurst Castle. The Scots and English Presbyterians, deeming the regal person sacred and inviolable, thought to rescue him, but were defeated, and their representatives expelled from Parliament, which appointed a court to judge the King. He was removed from Hurst Castle to Windsor on Dec. 23, 1648, and on Jan. 20, 1649, was taken to Westminster Hall, where the court was opened with great solemnity. Charles repudiated its legality and refused to plead. On the 27th he was sentenced to death as a tyrant, murderer, and enemy of the nation, by 67 out of the original 135 judges. Scotland protested, the royal family entreated, France and the Netherlands interceded, in vain. After a pathetic parting from two of his children he calmly prepared for death and bore

himself with dignity. He was beheaded at Whitehall, Jan. 30, 1649. His last words were: "I must tell you that liberty and freedom consist in having of government those laws by which the lives and the goods of the people may be most their own. It is not having share in the government, sirs; that is nothing pertaining to them," a sentiment that was plagiarized by the opponents of Chartism as late as 1848.

In private character Charles was a man of culture, kind, of irreproachable life, and of great physical courage; but in political affairs he was unscrupulous and blindly obstinate in his belief in the "divine right of kings." In religious affairs he was loyally attached to the national church of England and steadfastly refused to assent to the abrogation of episcopacy, which he held an essential in church government. By Charles II's personal edict at the Restoration, until its cancellation by Parliament in 1859, January 30 received special observances in the Anglican church as "the day of the martyrdom of the Blessed King Charles I." After his death appeared *Eikon Basilike: The Portraiture of his Sacred Majesty in his Solitude and Sufferings*, attributed to the King, but written by Bishop Gauden, who in 1651 published at The Hague *Reliquiæ Sacræ Carolinæ, The Works of that Great Monarch and Glorious Martyr, King Charles I.* The best works on the reign are: Gardiner, *History of England, 1603–42* (10 vols., London and New York, new ed. 1883–84), and his *Civil War* (4 vols., London, New York, and Bombay, 1894–97), containing full citation of the original sources; also his *Puritan Revolution* (London, 1876); Ranke, *History of England* (trans. by C. W. Boase and G. F. Kitchin; 6 vols., Oxford, 1875); Trevelyan, *England under the Stuarts* (London, 1905); Chancellor, *Charles I, 1600–25* (London, 1886); Harris, *Life and Works* (London, 1758); Skelton, *Life of Charles I* (London, 1898); Masson, *Life of Milton* (7 vols., London, 1873–94); Disraeli, *Commentaries on the Life and Reign of Charles I* (5 vols., London, 1828–31). Original materials are contained in: *Letters of Charles I to Henrietta Maria* (London, 1836); Clarendon, *Great Rebellion* (6 vols., Oxford, 1888); Whitelocke, *Memorials* (4 vols., new ed., Oxford, 1853); Gardiner, *Constitutional Documents* (Oxford, 1889); the *Calendars of State Papers*, edited by Hamilton (London, 1890–93).

CHARLES II (1630–85). King of England, Scotland, and Ireland from 1649 (reigned from 1660) to 1685. He was the second, but eldest surviving, son of Charles I, and was Prince of Wales from his birth. He was born at St. James's Palace, London, May 29, 1630, and baptized by Bishop Laud on June 27, Louis XIII of France being one of his sponsors. At eight years of age an establishment was provided for him as heir apparent, with William Cavendish, Earl of Newcastle, as governor, and Dr. Brian Duppa as tutor. The following year he broke his arm, and his life was endangered by a severe illness. He took his seat in the House of Lords in 1641, and his first public act was to carry his father's letter in favor of Strafford to the peers. He held a nominal command in the early campaigns of the Civil War, and was present at Edgehill in 1642, where he narrowly escaped capture. Appointed general of the western forces, he parted from his father at Oxford, March 4, 1645, and remained in safety in Somerset, Devon, and Cornwall; after Naseby, he escaped by way of Scilly and Jersey and joined his mother in Paris, where he remained for two years, to his moral disadvantage. In July, 1648, he sailed from Helvoetsluis with a small fleet for the Thames, where he took several prizes. He issued a proclamation of conciliation to the Londoners and Scots, and returned to The Hague, where during his father's trial he did his utmost to save him, forwarding a blank charter with his signature attached for Parliament to inscribe its own terms of clemency. At his father's death he assumed the title of King and was proclaimed in Scotland, Ireland, the Channel Islands, and one or two places in England. After vacillating between Holland, France, and Jersey, with the intention of invading Ireland, he returned to Holland, and, embarking at Terheyden for Scotland, landed in Cromarty Firth, June 24, 1650, despite an attempt to intercept him. On September 3 a Scottish force fighting for him was defeated at Dunbar, and this hastened his coronation at Scone, Jan. 1, 1651, after an acknowledgment of his father's faults and various declarations and concessions of a feeble character. He suddenly invaded England the following August with 10,000 men and was proclaimed King at Carlisle and other places on his advance. Cromwell hastened to meet and surround him and after two encounters routed his army at Worcester, Sept. 3, 1651. Charles was hunted and a price was put upon his head, but after hiding at Boscobel and other places, through the loyalty of friends and his own courage and address, he safely embarked at Shoreham on October 15 and landed at Fécamp, Normandy, the next day. Eight years of impecunious and profligate exile were variously spent in France and at Cologne and Bruges, until not long after Cromwell's death, when, the country being threatened with military despotism, the popular wish throughout England for the restoration of royalty was consummated by General Monk (q.v.), after Charles's conciliatory Breda declaration, and he was proclaimed King at Westminster, May 8, 1660. He landed at Dover on the 26th, and was welcomed, at Whitehall, by the two Houses of Parliament on May 29, 1660, after an enthusiastic acclamation by thousands on his progress through London. He was crowned on April 23, 1661. His first Parliament, distinguished by abasement and insistence on "royal prerogative," gave him an untrammeled course. Clarendon, his dignified companion in exile, was appointed chief minister. Episcopacy was restored, and English and Scotch Nonconformists and Presbyterians subjected to persecution. He extended an indemnifying Act, dating from Jan. 1, 1637, to June 24, 1660, to all political offenders, excluding the regicides, of whom 13 were executed, while the bodies of Cromwell and Ireton were hung in chains, and the remains of Blake, Bradshaw, and others cast out of Westminster Abbey into potter's fields. Extravagant, and always in want of money, Charles gladly assented to the abolition of the feudal rights of knight service, wardship, and purveyance in consideration of an annuity of £1,200,000, which, however, was never fully paid. On May 20, 1662, he married Catharine of Braganza for her large dowry. The failure of the subsidies to produce the amount agreed on and the chronic mismanagement of the English finances brought the King to a desperate need of money. The choice faced him of secur-

ing this from Parliament or else of selling the control of England's foreign policy to the highest bidder. But to accept the first alternative meant to become the slave of Parliament, and, beneath his easy-going exterior, Charles cherished the desire to recover the absolute power that had been lost by his father and grandfather. On the other hand, a ready purchaser of the foreign policy was found in Louis XIV, who desired to extend French power on the Continent and needed England's aid, or, at least, England's neutrality, for the success of his plans. In return for French subsidies Charles plunged England into a war with Holland in 1672, from which the country as a whole had little to gain. The war, however, was not unpopular; commercial rivalry had already brought about two wars between the two countries, the last one having occurred in the early years of the reign (1665–67). The Dutch War of 1672 did not prove a success, and some knowledge of the negotiations with France, joined with Charles's efforts towards absolutism, brought him into conflicts with his Parliament, which lasted nine years, until Charles, aided by French subsidies, was able to dissolve his last Parliament (1681). The last years of the struggle were especially embittered on account of fear of Roman Catholicism, towards which church the King was suspected to have leanings and to which his brother and heir, the Duke of York, confessedly belonged. This feeling culminated in the Popish Plot (see OATES), which resulted in the execution of many innocent victims. From 1681 to his death Charles ruled as an absolute king. An attempt, the Rye House Plot (q.v.), was made to check this, but failed, and Charles ruthlessly struck down all who opposed him. He never lost, however, the favor which his easy manners had won from the people, and at his death, Feb. 6, 1685, he was sincerely mourned. In his dying hours he received absolution from a Roman Catholic priest, although he had not previously avowed his attachment to that religion. Undoubtedly able, Charles's carelessness and love of ease prevented him from showing the ability he really had. To have maintained absolute rule in England for four years, and that within a half century from the Great Rebellion, is no small feat. Totally lacking in moral fibre and surrounded by men like himself, he made his court one of the most dissolute England has ever known. Yet in his easy way Charles fostered the arts and sciences and did much to bring to England the best results of continental learning.

Bibliography. The best general accounts of the reign are Macaulay, *History of England*, (8th ed., London, 1852), and Ranke, *History of England* (Eng. trans., 6 vols., Oxford, 1875). The best biography is by O. Airy, *Charles II* (London, 1904). For the social side, consult: Sydney, *Social Life in England, 1660–1690* (London, 1892); Pepys, *Diary*, ed. Wheatley (London, 1899); Evelyn, *Diary* (new ed., London, 1854). A good short account is given by Stephen in the *Dictionary of National Biography*, vol. x (New York, 1887), under the heading "Charles II."

CHARLES I, THE BALD (trans. of Fr. *Charles le Chauve*) (823–877). King of France from 843 to 877; as Roman Emperor, Charles II. He was the son of Louis the Pious by his second wife, Judith. The determination of Judith to secure a kingdom for her son led to repeated wars between the sons of Louis, until, by the Treaty of Verdun, in 843, Charles received the western portion of the Empire, which from this time may be called the Kingdom of France, or, more strictly, the West-Frankish Kingdom. The government of Charles was weak; the great nobles were rapidly becoming independent; the Northmen pillaged the country, almost without resistance on the part of Charles, who bribed them to depart. Yet on the death of the Emperor Louis II, in 875, Charles received the Imperial crown through the favor of the Pope. Consult Dümmler, *Geschichte des ostfrankischen Reiches* (3 vols., Leipzig, 1887–88).

CHARLES II, THE FAT (trans. of Fr. *Charles le Gros*, Ger. *Karl der Dicke*) (832–888). King of France after 885; as Roman Emperor, Charles III. He was the third son of Louis the German (q.v.). At his father's death, in 876, he became King of only a portion of Germany; but in 882, after the death of his two brothers, he became King of Germany; within eight years seven kings of the Carolingian line met with untimely deaths, and only one left a legitimate heir. In 885 the only two representatives of the male line were Charles and a boy five years old, afterward Charles the Simple of France. Consequently, Charles was recognized as King, and ruled over almost all the lands which had formed the Empire of Charles the Great. He had been crowned Emperor of the Romans in 881. He was a weak and cowardly ruler. When the Northmen besieged Paris, he made no resistance, but bribed them to leave the capital and allowed them to plunder elsewhere. His subjects revolted. He was deposed in 887 and died in January, 888. Consult Dümmler, *Geschichte des ostfränkischen Reiches*, vol. iii (Leipzig, 1888).

CHARLES III, THE SIMPLE (trans. of Fr. *Charles le Simple*, or *le Sot*) (879–929). King of France from 893 to 929. He was the posthumous son of Louis the Stammerer. At the death of Charles the Fat, Eudes, Count of Paris, was chosen King of France; but many of the Franks were still faithful to the Carolingian dynasty and rallied about Charles. In 893 he assumed the crown and after three years of fighting forced Eudes to promise him the succession to the kingdom. Consequently, on the death of Eudes, in 898, he was generally recognized as King. He has usually been regarded as a weak ruler, but his reign was marked by two events of great importance, for both of which he was responsible. Of these the more important was the cession of the future Normandy to the Northmen. The other event was the conquest of Lorraine, a kingdom which he preferred to France and in which he remained as much as possible. In 922 his subjects revolted. Charles at first defeated them, but by treachery in 923 he was made a prisoner, and died in captivity in 929. Consult Eckel, *Charles le Simple* (Paris, 1899).

CHARLES IV, THE FAIR (trans. of Fr. *Charles le Bel*) (1294–1328). King of France from 1322 to 1328, and the last of the Capetian line. He was the youngest son of Philip IV the Fair and succeeded his brother, Philip V. His policy was to strengthen and consolidate the royal power. This he did by repressing unruly nobles, increasing the royal revenue, and adding cities, such as those of the Agenais, which he took from the English, to the royal domains. He introduced some changes in the coinage,

which still further aggravated the debasement begun under Philip the Fair. Consult Lavisse, *Histoire de France*, vol. iii (Paris, 1901).

CHARLES V, THE WISE (trans. of Fr. *Charles le Sage*) (1337–80). King of France from 1364 to 1380. He was the son of King John II the Good, and on his father's being made prisoner by the English at the battle of Poitiers (Sept. 19, 1356) he assumed the regency. The most significant event of his rule was the vigorous effort of the peasants, aided by a part of the bourgeoisie (see MARCEL, ETIENNE), to deliver themselves from the tyranny of nobles and the court, which resulted in the popular uprising called the Jacquerie. Upon the death of his father, in 1364, Charles ascended the throne. By his cautious policy he succeeded in introducing order in the kingdom and in re-establishing the power of the crown, which had been much shaken. War with England raged for a number of years, but with results highly favorable to Charles, who stripped his enemies of all their conquests in France except a few fortified places. He died Sept. 16, 1380. Charles was a generous patron of literature and the arts. He founded the Bibliothèque Royale and increased the privileges of the university. He rid himself of the so-called "grand companies," bands of mercenaries who were terrorizing many parts of the country, by employing them in wars outside of France. (See DU GUESCLIN.) He built the Bastille to keep the turbulent citizens of Paris in order. See Delacheval, *Histoire de Charles V* (Paris, 1908).

CHARLES VI (1368–1422). King of France from 1380 to 1422. He was the son and successor of Charles V and less than 12 years of age at his father's death. For several years he was under the guardianship of four uncles, one of whom (the Duke of Anjou) acted as regent. Their ambitions led to civil war. In 1388 Charles took the government into his own hands and ruled well for some years, till he became insane. A regent was appointed, and party strife broke out again. The two great parties into which the nation was divided were those of Orléans and Burgundy. Each party at different times called in the English to its aid. Henry V took advantage of the civil conflict and at the battle of Agincourt, in 1415, won a victory which left France almost helpless. Murders, massacres, and all the horrors of civil war devastated France until, in 1420, a peace was made at Troyes, by which Charles VI disinherited his son and accepted Henry V as his successor. He died Oct. 21, 1422, leaving most of France in the hands of the English. See AGINCOURT; ARTEVELDE, PHILIP VAN; FRANCE. Consult Lavisse, *Histoire de France*, vol. iv (Paris, 1902).

CHARLES VII (1403–61). King of France from 1422 to 1461. He was the fifth son and the successor of Charles VI and was born on Feb. 22, 1403. When his father died, Charles had little prospect of ruling France. Paris and almost all the north were in the hands of the English, who proclaimed as King Henry VI of England, who was then 18 months old, and made the Duke of Bedford regent. For the first six years Charles showed little energy and was compelled by the English to evacuate Champagne and Maine. In 1427 the French forces obtained their first success, when the English failed in their siege of Montargis; but in October, 1428, the latter invested Orléans, which was the most important city held by the party of Charles, and on Feb. 12, 1429, the French met with a disastrous defeat at Harengs. At this critical moment Joan of Arc came to the King's aid, and the siege of Orléans was raised on May 8, 1429. Charles was consecrated King at Rheims, July 17, 1429. The English gradually lost their possessions in France, and the Duke of Burgundy, their ally, went over to Charles. The latter entered Paris in 1436, and in the following years the English lost all their French possessions except Calais. The last battle, a disastrous defeat for the English, was at Castillon, July 17, 1453. After he was established on the throne Charles devoted himself to the reorganization of the government, to the reform of the finances, and to the formation of a powerful and well-disciplined army. He strove by every means to increase his own power, but his government was not despotic, and France recovered from the effects of the terrible calamities of the long war. Charles encouraged commerce and literature and had the prosperity of his subjects at heart; but he was timid and irresolute, afraid of plots against himself, and almost continuously under the control of some woman. He made no effort to save the Maid of Orléans from her fate. For many years he yielded in almost everything to the wishes of his mistress, Agnes Sorel, who, however, exercised a beneficent influence over him. See AGNES SOREL. Consult Lavisse, *Histoire de France*, vol. iv (Paris, 1902).

CHARLES VIII (1470–98). King of France from 1483 to 1498. He was born at Amboise and succeeded to the throne on the death of his father, Louis XI, in 1483. For some time the government was carried on under the regency of his sister, Anne of Beaujeu, who displayed fine political statesmanship in defending the rights of the crown against the encroachments of the States-General, in the repression of the feudal princes, and in the annexation to France of Brittany through the marriage of its Duchess, Anne, to the young King. When Charles attained his twenty-first year he took the royal power into his own hands. He was a high-spirited, generous youth and a good king; but his fame rests less on his rule in France than on the part he played in the history of Italy. Solicited in 1494 by Ludovico il Moro, Duke of Milan, to help him against Alfonso of Naples, Charles revived the ancient claims of the house of Anjou to the Kingdom of Naples and achieved its conquest the following year. The Italian princes were alarmed at his success, and the League of Venice was formed against him, by the Pope, the Emperor, Maximilian I, Ferdinand of Aragon, Venice, and Milan. An attempt was made to bar his exit from Italy; but at Fornovo, near Piacenza, Charles broke through a powerful army and safely effected his retreat. It was with difficulty that he was deterred by his councilors from resuming his warlike designs on Italy. Charles's incursion into that country marks an epoch in the history of the peninsula. Left to itself, Italy might have attained national unity, as Spain did, or France. With the incoming of Charles began the intrusion of the northern nations into Italian affairs, and that play of policy which went on for 400 years in the distracted country and did not end till the last foreigner (the French at Rome) departed from Italian soil in 1870. Consult: *Memoirs of Philip de Comines* (trans., London, 1855); Dela-

borde, *Charles VIII en Italie* (Paris, 1884); Ségur, *Histoire de Charles VIII* (Paris, 1884); Lavisse, *Histoire de France*, vol. v, part i (Paris, 1903).

CHARLES IX (1550–74). King of France from 1560 to 1574. He was born at Saint-Germain-en-Laye, June 27, 1550. Charles succeeded his elder brother, Francis II, at the age of 10, under the regency of his mother, Catharine de' Medici. He was declared of age three years later, but his mother continued to rule in his name, though he bore the responsibility for her violent deeds. Intrigues and civil wars marked the whole course of his unhappy reign. The Huguenots were driven to take up arms in 1562. The barbarities and excesses practiced both by the followers of Guise and by the partisans of Condé (outrages in which Catholics and Huguenots were alike involved) would have been sufficient to characterize this reign as one of the most miserable in French history. But the diabolical Massacre of St. Bartholomew, which was deliberately planned and executed by Catharine solely for political purposes, eclipsed all the other brutalities of the epoch. Charles's character is somewhat of an enigma: well-meaning, but passionate and fundamentally weak, he never emancipated himself from the guidance of his mother, who involved him in his worst mistakes. He died at the Château de Vincennes, May 30, 1574. Consult Mérimée, *Chronique du règne de Charles IX* (Paris, 1889).

CHARLES X (1757–1836). King of France from 1824 to 1830, the last sovereign of the elder line of the house of Bourbon. He was born in Versailles, Oct. 9, 1757. He was the younger brother of Louis XVI and Louis XVIII, bore the title of Count of Artois, and in 1773 married the Princess Maria Theresa of Savoy. After the outbreak of the Revolution in 1789 he became the leader of the *émigrés*. In 1795 he sailed with an English expedition to Brittany to arouse the French Royalists against the Revolutionary government. Although the Vendéans were ready to rally around his standard in great force, his courage failed, and he returned to England, abandoning his deluded supporters in France to their fate. With the Restoration he reappeared in France and became the head of the bigoted ultra-Royalist faction. (See CHAMBRE INTROUVABLE.) In the circle of Jesuits, priests, and nobles of the old school that surrounded him originated most of those extreme measures against which the better-minded Louis XVIII ineffectually protested at times. The death of Louis, Sept. 16, 1824, brought Charles to the throne. He took the oath of adherence to the charter, but soon displayed his intention of restoring the absolutism of the old French monarchy. Popular discontent rapidly increased during the succeeding five years. The King sought in vain to allay it by embarking the nation in a military enterprise, the expedition against Algiers, undertaken in 1830. In March, 1830, Charles adjourned the chambers on account of an address of remonstrance in reply to a royal speech. In May the Chamber of Deputies was dissolved and new elections were ordered. The deputies who signed the address were reëlected. On July 25 the celebrated ordinances were signed putting an end to the freedom of the press, already largely curtailed, decreeing a new mode of election, and dissolving the recently elected chamber. The people of Paris took up arms, and the revolution of July 27–29 overthrew the Bourbon monarchs. As a last resource Charles abdicated the throne, Aug. 2, 1830, in favor of his grandson, Henry, Duke of Bordeaux. It was too late, however, as the revolution was accomplished, and Louis Philippe, Duke of Orléans, was chosen King of the French. Charles made his escape to England, resided for some time at Holyrood and afterward at Prague. He took no part in the political intrigues and attempts of the Duchess of Berry. He died of cholera at Görz, Nov. 6, 1836. Charles X was a characteristic example of that type of Bourbons who "never learn anything and never forget anything."

CHARLES III (1345–86). King of Naples from 1381 to 1386, also known as Charles of Durazzo and Charles II of Hungary. His father, Louis of Durazzo, Count of Gravina, died in prison, having rebelled against Joanna I of Naples. The Queen adopted Charles, but afterward abandoned him in favor of Louis I of Anjou. Charles descended into Italy, at the invitation of Pope Urban VI, and seized the crown of Naples (1381), causing Joanna to be strangled in prison (1382). Louis of Anjou contested the throne, and Charles had to wage war with his rival, who died in 1384. He was invited to accept the crown of Hungary by a party dissatisfied with the rule of Queen Elizabeth and her daughter and was crowned at the close of the year 1385; but soon a revolt was incited against the Italians, and Charles was poisoned in prison. Consult Sayous, *Histoire générale des Hongrois* (2d ed., Paris, 1900).

CHARLES II (1332–87). King of Navarre, known as THE BAD. He was the son of Philip of Evreux and Joanna, the daughter of the French King, Louis X. He became King of Navarre in 1349 on the death of his mother and in 1352 married Joanna, the daughter of John II of France. Between the two rulers an implacable hatred prevailed, resulting in great misfortunes to France. In 1354 war broke out, as King John had not given Charles Angoulême, which had been promised as a part of his bride's dowry, and in revenge Charles formed an alliance with the English and made preparations for the invasion of France. The two kings, however, became reconciled; Charles's territories were restored to him, and in 1355 he was ostensibly on terms of friendship with the King, but in reality plotting with the nobles against him. As a result, he was thrown into prison and was not freed until November, 1357. In the same year he was in Paris, at peace with the Dauphin, and enjoying great popularity with the bourgeoisie. As a champion of the people, he sided with Etienne Marcel in the revolt of Paris against the royal authority, and in June, 1358, was made captain general of the city. His perfidiousness and cruelty in repressing the Jacquerie destroyed his popularity, and after playing fast and loose with the Dauphin and the English he formed an alliance with the latter, which lasted until the Treaty of Brétigny in 1360. After 1362 his importance in French politics waned, but he found sufficient scope for the exercise of his talent for duplicity in the complicated politics of the Iberian Peninsula. In 1378 Charles V of France deprived him of his possessions in that country, while a Castilian army invaded Navarre. With the aid of the English, however, he succeeded in warding off the danger. He died on Jan. 1, 1387. Charles was possessed of great political genius and fine

oratorical gifts; but he was mercenary, cruel, and perfectly unscrupulous in the attainment of his ends. He was twice accused of attempting to poison the French King, not without sufficient evidence. Consult Lavisse, *Histoire de France*, vol. iv (Paris, 1902), and Meyer, *Charles II, roi de Navarre* (Paris, 1898).

CHARLES I (1863–1908). King of Portugal after 1889. The son of Luiz I and María Pía, the daughter of Victor Emmanuel II of Italy, he was born Sept. 28, 1863. He succeeded to the throne Oct. 19, 1889. He married, in 1886, Marie Amélie of Orléans, the daughter of the Comte de Paris. Of this union came two sons, Luiz Philippe, Duke of Braganza, born March 21, 1887, and Manoel, born Nov. 15, 1889. His reign has witnessed the rise of a strong radical party in Portugal, traceable in great measure to the financial difficulties under which the country labored during the last decade of the nineteenth century. In international affairs the political status of Portugal has been enhanced by the growth of European colonization in Africa. He and his eldest son were assassinated Feb. 1, 1908.

CHARLES I (1839–1914). King of Rumania. He was born April 20, 1839, the second son of Prince Karl Anton of Hohenzollern-Sigmaringen. He served in the Prussian army and after the dethronement of Alexander John (Cuza) was elected Prince of Rumania, April 20, 1866, and arrived in the capital, Bucharest, in May. The country was in a wretched condition, the prey of rival factions and foreign intrigues. The new Prince showed tact and statesmanship in the work of reorganization. At the outbreak of the Russo-Turkish War, in 1877, the Rumanian army was mobilized, an alliance was concluded with Russia, and Prince Charles took command in person. The army was kept in Rumanian territory for some weeks, after the opening of the campaign, because of Austrian jealousy of military activity on the part of her Balkan neighbors. Prince Charles took the field with his Rumanians, however, when an attack on Plevna had been opened, and rendered valuable assistance in the hardest fighting of the war. A few weeks after the beginning of the war Rumania declared her independence (May 21). In 1881 Rumania assumed the title of Kingdom, and on May 22 Charles was crowned as King at Bucharest. Under him the internal development of the country has gone actively forward, education has advanced, and a safe course has been steered in the difficult politics of southeastern Europe. Charles married Princess Elizabeth von Wied (known by her pen name "Carmen Sylva"), Nov. 15, 1869. Upon the death of the only child of this union the succession was settled upon Prince Ferdinand of Hohenzollern-Sigmaringen, a nephew of the King, in 1889. The Crown Prince has two children. During the recent war of the Balkan states Rumania held aloof and now occupies the position of policeman to keep peace among the petty states. This has enabled King Charles to carry on without interruption the work of making of Rumania a civilized state. He is greatly beloved among the peasantry, but the landowning *Boyards* are opposed to him on account of his agrarian-reform views. Consult Whitman, *Reminiscences of the King of Rumania* (London, 1899).

CHARLES I. King of Spain. See CHARLES V, Holy Roman Emperor.

CHARLES II (1661–1700). King of Spain from 1665 to 1700. He was the son of Philip IV and was but four years old when his father died, the regency being in the hands of the Queen mother, Maria Anna of Austria. During her rule Spain was much weakened by an unsuccessful war with France and by the loss of Sicily. In 1675 Charles assumed the government, taking for his chief adviser that brilliant and popular national hero, the second Don Juan of Austria, an illegitimate son of the late King by his mistress, the renowned actress María Calderón, known as *La Calderona*. By marrying Louise of Orléans, a niece of Louis XIV, Charles maintained harmony with France for several years. After her death Charles married a sister of the Emperor Leopold I, María Ana of Newburg. He joined the Grand Alliance in the war against Louis XIV, which was concluded by the Peace of Ryswick (1697). Charles was childless and was prevailed upon to appoint as his successor Philip of Anjou, grandson of Louis XIV. On his death, Nov. 1, 1700, the claim of Philip of Anjou was contested and the War of the Spanish Succession ensued. See SUCCESSION WARS; CHARLES VI; LOUIS XIV. Consult: Marquis de Villars, *Mémoires de la Cour d'Espagne sous la* [sic] *règne de Charles II, 1678–82* (ed. by William Stirling, London, 1861); Marquis de Villars, *Mémoires de la Cour d'Espagne de 1679 à 1681, publiés et annotés par M. A. Morel-Fatro, et précédés d'une Introduction par M. Le Marquis de Vogüé* (Paris, 1893); the *Letters* of the Marquise de Villars (Paris, 1868); Hume, *The Spanish People* (London, 1901).

CHARLES III (1716–88). King of Spain from 1759 to 1788. He was the first son of the second marriage of Philip V and great-grandson of Louis XIV of France. Parma and Piacenza were obtained for him when he was only 16, to satisfy the ambition of his mother, Elizabeth Farnese. In 1734 he invaded the Two Sicilies, then belonging to Austria, and completed their conquest in 1735, when he was crowned King as Charles III, the Emperor Charles VI being forced to recognize his title in the treaties of Vienna (1735, 1738). On the death of his half brother, Ferdinand VI, in 1759, Charles succeeded to the Spanish throne. He was a man of no great ability (so foreign ministers who had to deal with him agreed), and his foreign policy was disastrous; but he had liberal ideas and effected many reforms, especially in internal affairs and in financial administration. The Jesuits were banished in 1767, and an effort was made to bring the Inquisition under the control of the civil power. This effort was so nearly successful that, although the Inquisition was not abolished, it was rendered nearly innocuous. The power of the church in civil affairs was greatly restricted, and the number of idle clergy, especially the number of monastic orders, was considerably reduced. Charles endeavored to put a stop to brigandage and to Algerine piracy, and interested himself in the development of commerce and the arts and sciences, doing away with much antiquated legislation that was a hindrance thereto. He was an ally of France in the Seven Years' War, and in 1763 was compelled to cede Florida to England, Louisiana being made over to Spain by France. At the close of the American War of Independence Florida was restored to Spain. Unsuccessful

attempts were made in 1781 and 1782 to take Gibraltar from the English. Charles died in Madrid, Dec. 14, 1788. Although he had done much to restrict the power of the church, the Inquisition, and the orders, he was personally a zealous, practicing Roman Catholic and tried earnestly to persuade the Pope to proclaim the dogma of the Immaculate Conception as necessary to salvation. Consult: Colletta, *History of the Kingdom of Naples, 1734–1825*, trans. by Horner (Edinburgh, 1858); Ferrer del Río, *Historia del Reinado de Carlos III en España* (4 vols., Madrid, 1856); Armstrong, *Elizabeth Farnese* (London, 1892); Danvila y Collado, "Reinado de Carlos III," 6 vols., in the *Historia general de España de la Real Academia de la Historia*, published under the direction of Cánovas del Castillo (Madrid, 1892); Conde de Fernan-Núñez, "Vida de Carlos III," annotated ed. in 2 vols. by A. Morel-Fatio and A. Paz y Melia, vols. xiv and xv of the *Libros de Antaño* (Madrid, 1898); F. Rousseau, *Règne de Charles III d'Espagne* (2 vols., Paris, 1907).

CHARLES IV (1748–1819). King of Spain from 1788 to 1808. He was the second son and successor of Charles III and was born in Naples, Nov. 12, 1748. When very young, Charles married his first cousin, Maria Luisa of Parma, who soon acquired great influence over him, despite her coarseness and immorality. In fact, it seems highly probable that he never realized her true character nor the undignified position in which she placed him. The government was conducted chiefly by Godoy (q.v.), a handsome but dissolute guardsman and a favorite of the Queen, who was made Duke of Alcudia and Minister of Foreign Affairs. Peace with the French Republic was concluded in 1795 after a disastrous war, undertaken at the instance of Godoy. Soon after this peace an offensive and defensive alliance was made with France, and Spain speedily became involved in war with Portugal and also with England, the main event of which was the destruction of the Spanish fleet by Nelson at Trafalgar in 1805. In 1807 Charles made a secret treaty with Napoleon according to which Portugal was to be seized by the French and Spanish, and the greater part to be divided between Godoy and the Infanta Maria Luisa, Queen of Etruria, while Charles was to assume the title of Emperor of America; at the same time 16,000 Spanish troops were to be sent to the assistance of the French in Denmark. Meanwhile Napoleon was intriguing with Don Ferdinand, the heir to the throne. On March 19, 1808, Charles, alarmed by disturbances in Madrid, abdicated in Ferdinand's favor. He declared immediately that this act was not voluntary. In a meeting with Napoleon at Bayonne, Charles surrendered the crown on May 5, 1808, to the French Emperor, who gave him a pension of 6,000,000 francs and the castle and grounds of Chambord. He died Jan. 20, 1819, in Rome. See GODOY; SPAIN. Consult also Gen. Gómez de Arteche, "Historia del Reinado de Carlos IV," 3 vols., in the *Historia General de España de la Real Academia de la Historia* (Madrid, 1892 et seq.).

CHARLES IX (1550–1611). King of Sweden from 1604 to 1611. He was the third son of Gustavus Vasa and in 1560 became Duke of Södermanland. In 1592 he became regent of the kingdom after the death of his brother, John, and as such favored the introduction of the Reformed religion into Sweden. In 1593 he secured the adoption of the Augsburg creed as the basis of the national religion, and he confirmed the position of Protestantism by his victory at Staongebro in 1598 over his nephew, Sigismund of Poland, who was rightful King of Sweden, but who, as a decided partisan of Catholicism, was objectionable to the mass of the people. After many attempts at compromise, Sigismund was formally deposed in 1599 and Charles was offered the royal title. At first he merely accepted the regency, but in 1604 he yielded to the popular demand and was crowned King of Sweden. He engaged in wars with Poland, Russia, and Denmark, but his people did not share his ambitions and denied him the support he desired. Charles founded the University of Gothenburg and made a new code of laws. He wrote a rhymed chronicle of the war with Poland.

CHARLES X GUSTAVUS (1622–60). King of Sweden from 1654 to 1660. He was born at Nyköping, Nov. 8, 1622, the son of Catharine, eldest sister of Gustavus Adolphus, and of John Casimir, Count Palatine of Zweibrucken (Deux Ponts). After studying at the University of Upsala, he traveled through France, Germany, and Switzerland, and joined the army of Torstenson (q.v.) in 1642. He fought at the battles of Jankau and Leipzig, and at the close of the Thirty Years' War was the representative of Queen Christina at the conference held subsequent to the Treaty of Westphalia. On the abdication of Christina he succeeded, June 16, 1654, to the throne of a kingdom in an almost bankrupt condition. In 1655 Charles invaded Poland, whose King, John Casimir, indulged in pretensions to the Swedish crown, compelled the Elector of Brandenburg, Frederick William, to enter into an alliance with him, defeated the Polish army in a great battle at Warsaw (July 28–30, 1656), and overran the country, but retired when Russia and Austria prepared to assist the Poles, while the King of Denmark invaded the Swedish territories in Germany. He attacked Denmark in 1658 and secured for Sweden the provinces of Scania, Halland, and Blekinge by the Treaty of Roeskilde. Renewing the war in the same year, Charles laid siege to Copenhagen. The Dutch came to the assistance of the Danes and defeated the Swedish fleet, and in 1659 Charles had to abandon the siege. At the same time his forces were defeated in Pomerania by the Elector of Brandenburg, who had turned against him. He succeeded in holding his own, however, and at the Peace of Oliva, signed a few months after his death, Sweden retained the conquests she had made from Denmark prior to 1658 and those gained south of the Baltic before 1648. Charles died in Gothenburg, Feb. 13, 1660. As a general, Charles ranks equally with his predecessor Gustavus Adolphus and his successor Charles XII. His most famous exploit was the crossing of the straits separating the Danish mainland from the islands on the ice formed by the dense winter cold in 1657–58. This crossing of the "Belt" crushed out the Danish resistance and forced a favorable treaty for Sweden. Consult: Geijer and Carlson, *Geschichte Schwedens*, vol. iv (Gotha, 1855–75); Bain, *Scandinavia* (Cambridge, 1905); Haumant, *La Guerre du Nord et la paix d'Oliva* (Paris, 1893).

CHARLES XI (1655–97). King of Sweden from 1660 to 1697. He was the son of Charles X and Hedwig Eleonora of Holstein and was born Nov. 24, 1655. During his minority the

government was intrusted to his mother, Hedwig, as regent. By the Peace of Oliva (May 3, 1660) with Poland, Sweden obtained Esthonia, part of Livonia, and Oesel, and the Polish monarch renounced all pretensions to the Swedish crown; that of Copenhagen (June 6, 1660) was generally confirmatory of the Treaty of Roeskilde with Denmark in 1658. (See CHARLES X.) A treaty with Russia on the basis of the status quo followed in 1661; and from this period till 1672 the kingdom was free from foreign wars, but it was misgoverned by the regency and the education of the young King was neglected, willfully, it is charged, in order that he might longer be kept in leading strings. Until he reached manhood he could neither read nor write. In December, 1672, Charles assumed the reins of government. In 1674 he was called upon by Louis XIV, under a treaty made by the regency, to engage in the war of France on the German princes and Holland. The Swedes invaded Brandenburg and met a severe defeat at Fehrbellin in 1675. Charles, however, overthrew the Danes, who were allies of Brandenburg, at Halmstadt, Lund, and Landskrona, but his fleet was defeated by the Dutch near Oeland, and again by the Danes at Blekinge and Kioge; and many of Sweden's recent acquisitions were wrested from her. These, however, were restored by the Peace of Saint-Germain-en-Laye (Sept. 17, 1679). Charles now entered upon an active period of reform in the administration, aided by his most trusted counselor, John Gyllenstern. In 1680 a struggle commenced between the crown, supported by the burghers and peasants, on the one hand, and the nobles on the other; and a considerable diminution of the power of the nobles was the consequence. The resumption of all the crownlands which had been alienated since 1609 was a fatal blow to the power of the nobles, and by a voluntary declaration of the estates, Dec. 9, 1682, the King was invested with absolute authority. By a judicious administration of the revenues, Charles was enabled to extinguish the public debt, reorganize the fleet and army, and by 1693 to dispense with extraordinary subsidies. Though absolute, he never imposed a tax but with the consent of the estates; and he published every year a detailed account of revenue and expenditure. He established the finances on a sound basis and brought the army and navy of the kingdom to a state of high efficiency. The codification of the laws was commenced, but was unfinished at his death, which took place in Stockholm, April 15, 1697. Consult Geijer and Carlson, *Geschichte Schwedens*, vols. iv, v (Gotha, 1855–75).

CHARLES XII (1682–1718). King of Sweden from 1697 to 1718. He was the eldest son of Charles XI and of Ulrica Eleonora of Denmark and was born in Stockholm, June 27, 1682. He received a careful early training under the eye of his father, and on his accession to the throne in 1697 his abilities were favorably commented on by the foreign ministers. He showed his mettle when Sweden, soon after his accession, was threatened by a coalition of Frederick IV of Denmark, Augustus the Strong, Elector of Saxony and King of Poland, and Peter of Russia, who was yet to win his title of "the Great." Sweden had been for 70 years one of the Great Powers of Europe, as a result of the policy of the kings of the house of Vasa; it possessed territory all about the Baltic, and its troops were reputed the best in Europe. The War of the North that was now brought on by the coalition was at first on Sweden's part a war of defense; then, through the successes of Charles, a war of aggression and conquest, and finally, through his failure, a struggle for existence. Its story is a mingling of brilliant triumph and disheartening defeat, both resulting from the meteoric and ill-balanced genius, reckless ambition, and fatal obstinacy of the Swedish King—qualities that have won for him in history the name of "Madman of the North." He was a born soldier and had taken Alexander the Great for his favorite hero. He was fond of all daring sports, careless of exposure, and unsparing of himself and others. When intelligence of the hostile league that threatened him reached Stockholm, the young King surprised every one around him by the energy and efficiency he displayed. Frederick IV of Denmark had invaded Schleswig-Holstein, whose Duke, a brother-in-law of the Swedish King, had called the latter to his assistance. In a six weeks' campaign Denmark was brought to terms, and Frederick signed the Peace of Travendal on Aug. 8, 1700. Charles now turned promptly to the defense of the Swedish possessions on the Baltic menaced by Russia and Poland. Russia sought to obtain the Swedish provinces of Ingra and Carelia, while Livonia and Esthonia, whose nobility detested the firm and often severe rule of Sweden, wished to put themselves under the weaker Polish monarchy. Hastening towards Riga, Charles compelled the Poles to raise the siege of that place, and then by forced marches brought his army of a little over 8000 men to the relief of Narva in Esthonia, which was beleaguered by 40,000 Russians, while Peter himself had gone to hasten the advance of 20,000 more. The disciplined Swedish troops, although jaded by forced marches, administered a severe defeat to the Russians before the walls of the city (Nov. 30, 1700), and Europe expected to see the whole Russian Empire brought under the sway of the young Swede who seemed to have revived the martial glory of the great Gustavus. Unfortunately for Charles, he seems to have entertained the same mad dream of conquest. Only the astute Peter looked the situation squarely in the face and sought to learn its lesson for Russia. He strengthened his alliance with Augustus of Poland, and at Birsen, in February, 1701, it was agreed that Augustus should occupy the attention of the Swedes in the west and Peter in the east, and that they should divide the Baltic provinces. The war thus opened in Denmark and the Baltic provinces involved the control of the Baltic and lasted for 21 years, ending in the marked diminution of the power of Sweden and the rise of Russia as the great Baltic power. Its first years, however, pointed to no such result. Influenced by the advice of his generals, Charles did not follow up his success against Peter, who was really his dangerous antagonist, but sought the overthrow of the King of Poland, while Peter was left to develop his resources. The conquest of Poland was accomplished, owing to the chronic disagreements among the nobility in that unfortunate country, but five years were necessary for its completion. The country was overrun by the Swedish troops, Augustus was finally driven into Saxony, and Charles, who had determined, against the advice of his principal counselor, Piper, to accomplish his enemy's de-

thronement, secured the election of Stanislas Leszczynski, who was crowned in Warsaw, in October, 1705. Meanwhile the Czar had been engaged in the conquest of the Baltic provinces and had been preparing for the ultimate contest with Charles. The latter now carried the war into Saxony, marching through Silesia and posing as the protector of the Protestants. Seeing his hereditary dominions in danger, Augustus sued for peace. Charles exacted from him in the Treaty of Altranstädt (1706) a renunciation of the Polish crown and of all alliances, the recognition of Stanislas, and the delivery to Charles of Patkul, the head of the Livonian malcontents, who had been instrumental in bringing about the coalition between Augustus and Peter. Patkul was executed as a traitor. Charles was now at the height of his power, with a disciplined army of 40,000 men, stationed near Leipzig, holding Germany in awe. If his military ability had been seconded by moderate and wise statesmanship, he might have made himself the most powerful sovereign of Europe. France hoped that he might attack the Grand Alliance, and the members of the Alliance feared it, but, after exacting humiliating terms from the Emperor Joseph I, Charles turned his face eastward to reconquer the Baltic provinces, and then to conquer Russia and perhaps Asia. He entered upon this daring plan with about 46,000 men. The tactics of the Russians were those afterward employed to defeat Napoleon. Charles was lured on into the interior of Russia, his army harassed on the way, and finally, on July 8, 1709, while besieging Poltava, on the border of the Ukraine, he was attacked by the Russian army in force, and the entire fabric of his military success was shattered in one disastrous engagement. His army was annihilated, and he himself barely escaped into Turkish territory, with 300 of his guard. He prevailed upon the Sultan to take up arms against Russia, and in 1711 Peter the Great found himself in a most precarious position on the banks of the Pruth. He was permitted, however, to escape, and the treaty which he was forced to conclude with the Turks was of no benefit to Charles. The Swedish monarch spent the next three years in semicaptivity among the Turks, engaged in fruitless intrigues to induce the Ottoman government to attack Russia. Had he at once returned to his kingdom and turned his real abilities to good use for the state, the history of Sweden might have been different. Instead, with an obstinacy that was simply madness, he wasted his time in this scheme for revenge. When he found that his plots were of no avail he defied the Turkish power, was made a prisoner, but escaped in 1714, and, dashing on horseback disguised through Hungary and Germany, reached Stralsund, which was at once invested by a combined force of Danes, Prussians, and Saxons, and after a year's siege compelled to surrender. The King was wounded in the siege. After driving the Danes from Scania, he invaded Norway and was killed by a cannon ball while besieging Frederikshald, Dec. 11, 1718. In private life Charles was almost an ascetic. See SWEDEN; PETER I; RUSSIA; POLAND.

Bibliography. The best English biography is by Bain, *Charles XII* (London, 1895). There are valuable Swedish works relating to his reign: Axelson, *Bidragtill kännedomen om Sveriges tillstånd på Karl XIII:s tid* ('Contribution to the Knowledge of the Condition of Sweden in the Time of Charles XII') (Wisby, 1888); E. Carlsen, ed., *Karl XII:s egenhändiga bref* ('Autograph Letters of Charles XII') (Stockholm, 1893); Carlson, *Sveriges historia under konungarne af det pfalziska huset* ('History of Sweden under the Kings of the Palatine House') (Stockholm, 1855–81), also in German abridgment (Gotha, 1887). Consult also Voltaire, *Histoire de Charles XII* (Rouen, 1730), which cites much valuable contemporary evidence. A very full bibliography may be found in Lavisse and Rambaud, *Histoire générale*, vol. vi (Paris, 1896). This work also contains an admirable account of the struggle for the Baltic.

CHARLES XIII (1748–1818). King of Sweden from 1809 to 1818. He was the son of King Adolphus Frederic. As high admiral of Sweden, he distinguished himself by winning a notable victory over the Russians in the Gulf of Finland in 1788. He also rendered important political and diplomatic services to his brother, Gustavus III, who created him Duke of Södermanland. After the assassination of Gustavus III, in 1792, Charles assumed the regency for Gustavus IV Adolphus and held it until 1796. In 1809, when at a critical juncture Gustavus had proved unequal to the situation, Charles was made administrator of the kingdom. A few months later Gustavus was deposed, and Charles accepted the kingship, under a constitution adopted by the Diet. He cultivated friendship with Russia and England. In 1814 the union of Norway and Sweden under one sovereign was effected, and he became its first king. In the latter years of his reign he was the mere vassal of his adopted son Bernadotte, who became Charles XIV upon his death. He died Feb. 5, 1818. See SWEDEN. Consult Bain, *Gustavus III and his Contemporaries* (London, 1895).

CHARLES XIV JOHN (1763–1844). King of Sweden and Norway from 1818 to 1844, and before his elevation to the throne Gen. Jean Baptiste Jules Bernadotte, a celebrated marshal of Napoleon. He was born in Pau, France, Jan. 26, 1763, the son of a French lawyer. He fought in the revolutionary wars (from 1794 as general of division) in Belgium, Germany, and Italy, and in 1799, in the last year of the Directory, was Minister of War. In 1800 he suppressed a rising of the Chouans, and in 1804 Napoleon created him marshal. He bore a distinguished part in the victory of Austerlitz in 1805, for which he was made Prince of Pontecorvo, and won fresh laurels in the campaign against the Prussians in 1806–07 and at Wagram in 1809. He was never one of the personal following of Napoleon, who appears to have been jealous of the general. He was chosen by the Swedish Diet in 1810 Crown Prince and successor of Charles XIII. The only condition of moment was that he should become a Protestant. Bernadotte agreed, changed his name to Charles John, and soon began to exercise many of the royal functions. The Crown Prince resisted the efforts of Napoleon to involve Sweden in his designs against England. The country was soon engaged in war with France, and at the head of the northern troops Prince Charles joined the allies in the final struggle with Napoleon and contributed to the victory of Leipzig (October, 1813). He forced Denmark in the Treaty of Kiel to give up Norway and conducted the campaign for its subjugation (1814). Charles XIII died in 1818 and was succeeded by Prince Charles John as Charles XIV John. The period of his admin-

istration was characterized by progress in all directions, both public and private. Charles was the only one of Napoleon's generals who founded a permanent dynasty. He died March 8, 1844. The present ruling house of Sweden is descended from Marshal Bernadotte, but intermarriage with Germans has made it thoroughly Teutonic. See SWEDEN. Consult: Meredith, *Memorials of Charles John, King of Sweden and Norway* (London, 1829); Sarrans, *Histoire de Bernadotte, Charles XIV Jean* (Paris, 1845); *Recueil des lettres, discours, et proclamations de Charles XIV Jean* (Stockholm, 1858).

CHARLES XV (1826–72). King of Sweden and Norway from 1859 to 1872. He succeeded his father, Oscar I, who was a son of Charles XIV John (q.v.). The rule of Charles was liberal and popular. Of him it is said that his motto was: "Build up the land upon the laws!" His legal reforms in the communal, ecclesiastical, and criminal branches of the law are evidences of his belief in the motto. To the political activity of Minister of Justice, Charles owes much of his reputation as a reformer. The most important event was the change (in 1866) in the constitution of the Parliament, which has since consisted of two chambers, one elected by the provincial representatives and the other by the people. He had a taste for literature and art and published a volume of poems. In 1850 he married Louisa, daughter of the King of the Netherlands, by whom he had one daughter, who became the wife of Prince Frederick of Denmark. He died Sept. 18, 1872. Consult Baath-Holmberg, *Carl XV, somenskild man, konung och Konstnar* (Stockholm, 1891).

CHARLES, ELIZABETH, née RUNDLE (1828–96). An English popular novelist, religious in bent and largely in subject matter, whose stories and novels, mildly interesting as narratives and historical pictures, touch almost every century and every country of Christendom. She wrote profusely, beginning with *Tales and Sketches of Christian Life* (1850) and ending with the last of 16 productions published between 1885 and 1896 for the Society for Promoting Christian Knowledge. *The Schonberg-Cotta Family* (1863), a story of the German Reformation, is her noteworthy book.

CHARLES, shärl, JACQUES ALEXANDRE CÉSAR (1746–1823). A French physicist. He made the first balloon using hydrogen gas (called *Charlière*, as distinguished from the *Montgolfière*, or fire balloon), and on Dec. 1, 1783, made a successful ascent to the height of nearly two miles. He invented a thermometric hydrometer and a number of optical instruments. In 1787 he anticipated Gay-Lussac's law of dilatation of gases.

CHARLES, LOUIS JOHN (1771–1847). Archduke of Austria. He was the third son of the Emperor Leopold II and was born in Florence, Sept. 5, 1771. He pursued his military studies with much ardor and, having displayed great ability in inferior commands in the battles of Jemmapes, Neerwinden, and Wattignies, was intrusted, in 1796, with the chief command of the Austrian Army of the Rhine. After inflicting repeated defeats upon Moreau, Jourdan, and Bernadotte, he drove the French across the Rhine and captured the stronghold of Kehl, Jan. 10, 1797. In 1799 he was again at the head of the Army of the Rhine, was several times victorious over Jourdan, protected Suabia, and successfully opposed Masséna, but suffered defeat at Zürich, June 4. In 1800 bad health compelled him to retire from active service, but, being appointed Governor-General of Bohemia, he formed a new army there. After the battle of Hohenlinden (1800) he was again called to the chief command and succeeded in staying the rapid progress of Moreau, but almost immediately entered into an armistice with him, which was followed by the Peace of Lunéville. In 1805 he commanded the army opposed to Masséna in Italy and fought the hard battle of Caldiero, but, upon bad tidings from Germany, retreated from the left bank of the Adige to Croatia. This retreat was one of his greatest military achievements. Made generalissimo of the Austrian forces, he won in 1809 the great battle of Aspern (q.v.), which first showed Europe that Napoleon was not invincible; but he did not promptly enough follow up his victory, and Napoleon, who hastened to reenforce his army, retrieved his fortunes at Wagram. The Archduke was now compelled to give way before the enemy, till he reached Znaim, where an armistice was concluded on July 12. In the campaigns of 1813 and 1814 he had no part. He lived in retirement till his death, which occurred April 30, 1847. He was author of *Grundsatze der Strategie* (1814). Consult Duller, *Erzherzog Karl* (Vienna, 1844–45), and Zeissberg, *Erzherzog Karl* (Vienna, 1895).

CHARLES, ROBERT HENRY (1855–). A British divine and author. He was born in county Tyrone, Ireland, and was educated at Queen's College, Belfast, Trinity College, Dublin, and Queen's University. He was ordained in 1883; was curate of St. Mark's, Whitechapel, in 1883–85, of St. Philip's in 1885–86, and of St. Mark's, Kensington, in 1886–89. In 1898 he became professor of Biblical Greek at Trinity College, Dublin, and from 1905 to 1911 was Grinfield lecturer on the Septuagint, Oxford. In 1898–99 he delivered the Jowett lectures on *The Doctrine of a Future Life in Israel, in Judaism, and in Christianity* (2d ed., 1913). He was made a canon of Westminster Abbey in 1913. His special field was the apocryphal books, and his publications include: *Book of Enoch* (trans. from the Ethiopic, 1893); *Ethiopic Text of the Book of Jubilees* (edited from four manuscripts, 1894); *Book of the Secrets of Enoch* (1895); *Apocalypse of Baruch* (trans. from the Syriac, 1896); *The Assumption of Moses* (1897); articles in the *Encyclopædia Biblica, Hastings Bible Dictionary,* and the *Encyclopædia Britannica; The Ascension of Isaiah* (trans. from Greek, 1900); *Testaments of the XII Patriarchs* (1908); *The Zadakite Fragments* (1912); *Studies in the Apocalypse* (1913).

CHARLES ALBERT (1798–1849). King of Sardinia from 1831 to 1849. He was the son of Prince Charles Emmanuel of Savoy-Carignan and in 1800 succeeded to his father's title and estates in France and Piedmont. In 1817 he married Maria Theresa, daughter of the Archduke Ferdinand of Tuscany. On the outbreak of the revolutionary movement in Piedmont in 1821, he was made regent upon the abdication of Victor Emmanuel I, until Charles Felix, the brother of the late King, should arrive to assume the sovereignty. He displeased, during his short reign of a week, both the Liberal party and its opponents, and Charles Felix disavowed all his acts and for some time forbade his appearance at court, exiling him to Florence. In

1829, however, he was appointed Viceroy of Sardinia. On the death of Charles Felix, April 27, 1831, he ascended the throne and performed several acts of constructive statesmanship by a reorganization of the finances and the creation of an army. Under the impulse of the movements of 1848 Charles Albert granted to Sardinia a constitution, the *Statuto*, which became the constitutional basis of the new Italy (see CAVOUR). The King entered warmly into the project of Italian unity and evidently expected to place himself at the head of the whole movement and of the new Kingdom of Italy. He was not, however, in real sympathy with the democracy of the new liberalism, and he was too visionary and unpractical to lead Sardinia along the difficult road that lay before her. When the Lombards and Venetians rose against the Austrian government, he declared war against Austria, March 23, 1848, and at first was successful; but his army was deficient in organization and leadership, and at Custozza, July 25, 1848, and at Novara, March 23, 1849, his hopes were wrecked by crushing defeats at the hands of the Austrians. On the battlefield of Novara he resigned the crown to his son, Victor Emmanuel. He retired to Portugal and died in Oporto in the same year. Consult: Cappalletti, *Storia di Carlo Alberto* (Rome, 1891); Bianchi, *Storia della diplomazia europea in Italia* (Turin, 1865); Costa de Beauregard, *La Jeunesse du roi Charles Albert* (Paris, 1809). See ITALY; SARDINIA; SAVOY, HOUSE OF.

CHARLES AUGUS'TUS (1757–1828). Grand Duke of Saxe-Weimar. He lost his father in the first year of his life and, together with a posthumous brother, was educated with great care during the regency of his mother, a woman of liberal ideas and great strength of character. Wieland, Knebel, and other prominent men were among the teachers of young Charles Augustus. In December, 1774, he made the acquaintance of Goethe, and they at once became friends. As soon as Charles Augustus assumed the reins of government, on his eighteenth birthday, he called Goethe to Weimar, and their intimacy was interrupted only by death. Owing to his own love of letters and the influence of his mother, Amalie (q.v.), the court of Saxe-Weimar became the shrine of German literature. Schiller, Herder, Wieland, and others lived under Augustus' protection, and the Court Theatre at Weimar witnessed the first production of *Iphigenie* (1786) and *Tasso* (1789). In 1786 Charles Augustus entered the Prussian army, in which he remained until the defeat at Jena in 1806, when he joined the Rhenish Confederacy and aided the French. In 1813 he joined in the coalition against Napoleon and commanded an army of Saxons, Hessians, and Russians. He fought among the allies in 1815, and the Congress of Vienna rewarded his services by enlarging his principality and making it a grand duchy. Goethe's influence was a lasting one in the character of Charles Augustus. His liberality in political opinions was the despair of Europe after the Congress of Vienna, but it made Saxe-Weimar one of the few well-governed and contented principalities of the age. Consult Düntzer, *Goethe und Karl August* (2d ed., Leipzig, 1888).

CHARLES CITY. A city and the county seat of Floyd Co., Iowa, 40 miles northwest of Cedar Falls, on the Illinois Central, and the Chicago, Milwaukee, and St. Paul railroads, and on Cedar River (Map: Iowa, E 1). The city has an opera house, home for the aged, public library, and parks, and is the seat of Charles City College (German Methodist), organized in 1891. It has good water power and manufactures store fixtures, wood furnishings, furniture, sashes and doors, harrows, and gasoline traction and stationary engines. Live stock, dairy products, nursery stock, and poultry are extensively shipped. Settled in 1856, Charles City was incorporated in 1869 and is governed by a mayor, elected biennially, and a council. The water works are owned and operated by the municipality. Pop., 1910, 5892.

CHARLES CITY CROSS ROADS, BATTLE OF. See FRAZIER'S FARM, BATTLE OF.

CHARLES DE BLOIS, shärl de blwä, or **DE CHÂTILLON** (?–1364). A claimant to the Duchy of Brittany. He was a nephew of Philip VI of France and contested the possession of the duchy with Jean de Montfort, who defeated him at the battle of Auray.

CHARLES EDWARD. See STUART, CHARLES EDWARD.

CHARLES EMMAN'UEL I, Duke of Savoy (1580–1630). See SAVOY, HOUSE OF.

CHARLES FRED'ERICK AUGUS'TUS WIL'LIAM (1804–73). Duke of Brunswick, son of Duke Frederick William, who fell at the battle of Quatre-Bras. He was born in the Duchy of Brunswick and after his father's death was put under the care of King George IV of England. He ascended the ducal throne in 1823, but his administration was intolerable, and he was expelled by his subjects in 1830. The remainder of his life he passed chiefly in London, Paris, and Geneva, and at his death he bequeathed his immense fortune to the last-named city.

CHARLES GRAN'DISON, THE HISTORY OF SIR. A novel by Samuel Richardson (1753), depicting the author's ideal of a faultless hero.

CHARLES MARTEL' (Fr., Charles the Hammer) (c.688–741). Mayor of the Palace under the last Merovingian kings, and the illegitimate son of Pepin of Heristal. After his father's death, in 714, he was at first imprisoned by his father's widow, but escaped in 715 and was proclaimed Mayor of the Palace by the Austrasians. A war between Austrasia and Neustria followed, which ended in Charles becoming undisputed ruler of all the Franks, the titular kings being mere puppets in his hands. He was engaged in long wars against the revolted Alemanni, Bavarians, and against the Saxons, but his importance as a historic personage is chiefly due to his wars against the Saracens, who, having conquered Septimania from the Visigoths in 720, advanced into Aquitaine, and in the succeeding years conquered Bordeaux, defeated the Duke of Aquitaine, crossed the Garonne, advanced to the Loire, and threatened Tours. Charles overthrew them near Poitiers, in 732, in a great battle, in which their leader, Abd-er-Rahman, fell, and their progress, which had filled all Christendom with alarm, was checked for a time. He drove them out of the Rhône valley in 739, when they had again advanced into the Burgundian territories as far as Lyons, deprived them of Languedoc, which he added to the Kingdom of the Franks, and left them nothing of their possessions north of the Pyrenees beyond the river Aude. Charles attempted to convert Saxony and Frisia to Christianity and gave aid to St. Boniface in his missions. He died

on Oct. 22, 741, at Quiercy on the Oise, leaving the government of the kingdom divided between his two sons, Carloman and Pepin the Short. Consult Breysig, *Jahrbücher des fränkischen Reiches, 714–741* (Berlin, 1869), and *Cambridge Mediæval History*, vol. ii (New York, 1913).

CHARLES OF ANJOU, ăn'zhōō', Count of Provence and King of Naples and Sicily (1226–85). He was the seventh child of Louis VIII of France and wedded Beatrice, heiress of Provence. In 1248 he went on a crusade in company with his brother, Louis IX, suffered captivity in Egypt with him, and returned to Provence in 1250. Exceedingly ambitious, he sought everywhere for opportunities to increase his possessions. For aid rendered Margaret of Flanders he was promised the Province of Hainaut, but Louis interfered, and Charles was compelled to relinquish Hainaut for a large sum of money. In 1262 Pope Urban IV invited Charles to assume the crown of the Two Sicilies and to assist in the overthrow of the bastard Manfred, the Ghibelline King. In 1263 Charles was made Senator of Rome and in 1266 was crowned King of the Two Sicilies. A crusade was preached against Manfred, who was overwhelmed and slain in the battle of Benevento. In 1268 the young Conradin, the legitimate heir, was defeated at Tagliacozzo, captured, and executed; a like fate was dealt out to many Italian nobles; estates were confiscated to reward the French mercenaries, and Charles established himself firmly in power. In 1270 Charles participated in the disastrous crusade of his brother, Louis IX, and later (1282), when he was preparing for another expedition, news was brought of the rebellion afterward known as the Sicilian Vespers (q.v.). Charles at once sent his fleet against Messina, refusing all offers of capitulation; but the city held out until assistance came from Don Pedro of Aragon, and Charles's fleet was burned. In 1285 the King died at Poggio. Charles of Anjou was one of the most powerful rulers of his time in Christendom. He was all-powerful in the councils of France; ruled over Anjou, Provence, and the Two Sicilies; was Senator of Rome, Imperial Vicar of Tuscany, Governor of Bologna, and lord of several other cities; he had also bought the rights to the Kingdom of Jerusalem. Consult: Sternfeld, *Karl von Anjou* (Berlin, 1888), which treats of Charles's career up to 1265; *Archivio storico Italiano* (3d series, vols. xxii–xxvi, Florence, 1875–77; 4th series, vols. i–vii, Florence, 1878–81); Jordan, *Les origines de la domination angevine en Italie* (Paris, 1909).

CHARLES OF ORLÉANS, ôr'lā'ăn' (1391–1465). A French poet and nobleman, the son of Duke Louis of Orléans. He was brought up at the court of Blois, married Isabella, widow of Richard II of England, in 1406, and upon the death of his father (who was murdered, in 1407, by the Burgundians and Valentino of Milan) succeeded to his estates. At the battle of Agincourt (1415) he was joint commander and was taken prisoner. He was never in close imprisonment, but it was nearly 25 years before he was ransomed and returned to Blois. Here he married Mary of Cleves and gathered about him the literary people of the day—Villon, Chastelain, and others. He is best known by his poems, some written in prison and some, of particular interest to the philologist, composed in English. His favorite subjects were Love and Spring, and on these two themes he composed many rondels, one of which is the charming *Le temps a laissié son manteau*, so often introduced into anthologies. His son became Louis XII of France. The best edition of his works is that by D'Héricault (1874), with a memoir. Consult Beaufils, *Etudes sur la vie et les poésies de Charles d'Orléans* (2 vols., Paris, 1875), and R. L. Stevenson, *Familiar Studies of Men and Books* (1882).

CHARLES RIVER. A river of eastern Massachusetts (Map: Massachusetts, E 3). It rises in the western part of Norfolk County in a number of small head streams which connect small lakes and, pursuing a zigzag northeasterly course, empties into Boston harbor. In the middle and lower parts of its 47-mile course the Charles is very attractive for boating excursions. The chief towns on its banks are the Newtons, Waltham, Watertown, Cambridge, Brookline, and Boston. Below Watertown the stream is tidal, and between Cambridge on one side and Boston on the other it widens into an estuary, part of which has been filled in, forming the Back Bay, the Fenway, and an extensive system of parked boulevards.

CHARLES'S WAIN. A common name for the constellation Ursa Major.

CHARLES THE BOLD (trans. of Fr. *Charles le Téméraire*) (1433–77). The last Duke of Burgundy. He was the son of Philip the Good, of the house of Valois, and of Isabella of Portugal, and was born in Dijon, Nov. 10, 1433. During his father's life he bore the title of Count of Charolais. He was of a fiery, ambitious, and violent disposition. From an early period to the end of his life he was a declared enemy of Louis XI of France, the nominal feudal superior of Burgundy, and when Louis caused Philip to deliver up some towns on the Somme, Charles left his father's court and formed an alliance with the Duke of Brittany and some of the great nobles of France for the maintenance of feudal rights against the crown. Their forces ravaged Picardy and Île de France, threatened Paris, and defeated the King at Montlhéry (1465). The result was a treaty by which the Count of Charolais obtained the towns on the Somme and the counties of Boulogne, Guines, and Ponthieu for himself. In 1467 he succeeded his father as Duke of Burgundy. The Burgundian realm comprised Flanders, Brabant, and nearly all the rest of the Netherlands, in addition to Burgundy and Franche-Comté. Richer and more powerful than any other prince of his time, Charles the Bold conceived the design of restoring the old Kingdom of Burgundy, which involved the conquest of Lorraine, Provence, Dauphiny, and part of Switzerland. War raged between him and France afterward with but little intermission till 1475. In September of that year Charles found himself at leisure to attempt the prosecution of his favorite scheme of conquest and soon made himself master of Lorraine. In the following year he invaded Switzerland, stormed Granson, but was soon after terribly defeated by the Swiss near that place and lost his baggage and much treasure. Three months later he appeared again in Switzerland with a new army of 25,000 men and laid siege to Morat, where he sustained in June, 1476, another and still more overwhelming defeat. Nevertheless he refused to listen to terms and laid siege to Nancy in the fall of 1476. His army was small, and, in a battle fought on Jan. 5, 1477, before that town, he was overwhelmed by René of Lorraine and his Swiss mer-

cenaries and lost his life. His daughter and heiress, Mary, married the Emperor Maximilian I. With his life ended the long resistance of the great French vassals to the power of the centralized monarchy. Consult Kirk, *History of Charles the Bold* (3 vols., Philadelphia, 1864–68), and Lavisse, *Histoire de France*, vol. iv (Paris, 1902).

CHARLESTON, chärlz'ton. A city and the county seat of Coles Co., Ill., 46 miles west of Terre Haute, Ind., on the Cleveland, Cincinnati, Chicago, and St. Louis, and the Toledo, St. Louis, and Western railroads (Map: Illinois, D 4). It is the seat of the Eastern Illinois Normal School and possesses a Carnegie library, a fine courthouse, and parks. It is the centre of a region having extensive oil, gas, and coal fields, and manufactures flour, brooms, stoves, and tiles. Charleston was settled in 1830, incorporated in 1855, and at present is governed under a charter of 1870 which provides for a mayor, elected biennially, and a council. The water works are owned by the city. One of the famous Lincoln-Douglas debates was held here in 1858. Pop., 1910, 5884.

CHARLESTON. A city and the county seat of Mississippi Co., Mo., 14 miles west by south of Cairo, Ill., on the St. Louis, Iron Mountain, and Southern Railroad (Map: Missouri, G 5). It is in a highly productive agricultural region and ships grain, flour, fruits, potatoes, and live stock. The industries include flour and saw mills, stave and heading factories, and manufactures of shoe braces, axe handles, etc. The water works are property of the municipality. There are many Indian mounds of historic interest near the city. Pop., 1890, 1381; 1900, 1893; 1910, 3144.

CHARLESTON. A port of entry and an important commercial centre, the largest city in South Carolina and the county seat of Charleston County (Map: South Carolina, D 4). It is 7 miles from the ocean, on a low peninsula formed by the Ashley and Cooper rivers, which unite in a broad bay affording an excellent harbor, 130 miles by rail from the State capital, Columbia, and 82 miles northeast of Savannah, Ga.

Charleston is a city of great historic and scenic interest, with picturesque houses surrounded by pleasant gardens and with some irregular and narrow streets. In the southern part of the city are White Point Garden—a finely wooded park, containing a monument to the Second Regiment, South Carolina Line, Continental Army, which defended Fort Moultrie, June 28, 1776, and a bust of William Gilmore Simms—and the Battery, a popular promenade commanding a view of the harbor. The corner of Broad and Meeting streets is the site of the courthouse, post office, and city hall, the last containing a collection of historic relics and portraits. Other prominent buildings are St. Michael's Church, opened for worship in 1761, the Roman Catholic Cathedral, St. Philip's Church (Protestant Episcopal), the custom-house of white marble, the Memminger Normal School, and the Charleston Museum. The city has a valuable library (subscription) of 40,000 volumes, dating from the year 1748, and a number of charitable institutions, the more notable of which are the Roper Hospital, Charleston Orphan House, Enston Home, and Home for Mothers, Widows, and Daughters of Confederate Soldiers. The Gibbes Memorial Art Gallery, founded through the beneficence of J. S. Gibbes, is well filled with art treasures. As an educational centre, Charleston is the seat of the College of Charleston, founded in 1785; the Medical College of the State of South Carolina; the Citadel, the Military College of South Carolina, which became known for the part its students played in 1861 in the Civil War; Porter Military Academy; and Avery Normal Institute for colored students. The city maintains a well-equipped system of public schools, dating from 1810, and comprising primary and grammar schools, and a girls' high or normal school in which are enrolled over 5000 pupils. About $60,000 is devoted annually to the educational department. Monuments of William Pitt, John C. Calhoun, Wade Hampton, and Gen. G. T. Beauregard, and a bust of Henry Timrod, the poet, are among the objects of interest. Outside of the city are found several resorts attractive on account of popular amusements and for natural beauties: the Charleston Country Club, just north of the city; the Isle of Palms, north of Sullivan's Island and directly on the ocean; Magnolia Gardens, 12 miles distant on the Ashley; and Sullivan's Island, with a fine beach for surf bathing. Magnolia Cemetery, three miles north of the city hall, is a beautiful spot, with fine trees, shrubs, and flowering plants. Hampton Park is a large and attractive public park in the northern part of the city on the Ashley. It is on the site of the Washington Race Course, founded shortly after the Revolution.

The harbor, landlocked and one of the safest on the coast, has been so improved since the construction of jetties as to admit large vessels, the depth of water on the bar at mean high water being over 30 feet. West of the channel is a lighthouse with a fixed light at an elevation of 155 feet. The harbor defenses include Fort Moultrie on Sullivan's Island—where the Federal government, at an expenditure of over $500,000, has made extensive improvements designed to render the artillery post at that point one of the most completely equipped in the United States—and Fort Sumter. The other forts, well known in history, are now abandoned. The United States Navy Yard on the Cooper River, about 7 miles from the city, is large and well equipped. Several millions have been expended in developing and improving it.

The city has about 9 miles of water front, most of the wharves lying on the Cooper River. Good transportation facilities, by rail and water, form a feature of its equipment as a commercial centre. The Clyde Line connects Charleston with New York, Boston, and Jacksonville, and freight steamers go to important foreign and domestic ports; the Atlantic Coast Line, Southern, and Seaboard railways afford railroad communication.

In the early years of the nineteenth century Charleston was the chief cotton port in the United States, and until 1860 it held third place among the cotton-receiving ports. Since the Civil War, however, the Charleston trade has developed but slowly, and some years ago the export trade actually began to decline, but in the past decade has begun to increase again, until now there are but two ports in the South exporting more products. Besides cotton exports there are exports of oil cake (cottonseed), cotton-seed fertilizers, and lumber products. The import trade has been steadily advancing, and there is an important wholesale and jobbing trade

with cities of the interior. Large quantities of fruit, early vegetables, and lumber are shipped to Northern cities, the total income from the truck crops amounting to more than $5,000,000 annually. Charleston, though known rather as a commercial centre, is the seat of considerable industrial interests, the principal of which is the manufacture of fertilizers. Other leading manufactures are clothing, foundry and machine-shop products, lumber and timber products, including sash, doors, blinds, and confections and cigars.

The government is administered, under the charter of 1836, by a mayor, who holds office for four years, and a city council, the members of which are elected one-half by wards and one-half at large. The executive controls appointments to the board of health and, with the consent of the council, nominates commissioners of the city hospital, board of fire masters, commissioners of the Colonial Common, and park commissioners. All other administrative officials are elected by the municipal council. The annual expenditures of the city amount to about $600,000, the main items of expense being $30,000 for street lighting, $50,000 for the fire department, $60,000 for charitable institutions, and $75,000 for the police department.

Pop., 1790, 16,359; 1860, 40,522; 1870, 48,956; 1890, 54,955; 1900, 55.807, including 31,522 persons of negro descent and 2592 of foreign birth; 1910, 58,333.

History. In 1670 an English colony under Gov. William Sayle came to Albemarle Point, on the west bank of the Ashley River, 3 miles from the present city, and founded Charles Town (named in honor of Charles II), the first permanent settlement in Carolina. In 1680 the public offices were removed to the present site of Charleston, where a number of families had previously settled. The population was increased, in 1685–86 by a company of Huguenot refugees, in 1755 by 1200 Acadian exiles, and in 1793 by 500 French refugees from Santo Domingo. In 1775 Charleston was one of the chief cities and the third seaport in importance in America, and it was the first Southern city to join the revolutionary movement. In February, 1776, the Provincial Congress of South Carolina met in Charles Town and on March 26 adopted the first independent State constitution. On June 28, 1776, the garrison on Sullivan's Island, under Colonel Moultrie (see FORT MOULTRIE), repulsed an attack by the British fleet, and in 1779 the city was again successfully defended, this time against General Prévost; but on May 12, 1780, with its garrison of 7000 under General Lincoln, it was captured after a siege of six weeks by a British force of 16,000 under Sir Henry Clinton, its loss being regarded as one of the greatest disasters of the Revolutionary War. On Dec. 14, 1782, the British evacuated the city and the Americans again took possession of it. Charleston was incorporated in 1783 and until 1790 was the capital of the State. In 1784 the first bale of cotton exported from America to Europe was shipped from this port. Charleston was the centre of the nullification movement of 1832, and in 1860 the Democratic convention, being afterward adjourned to Baltimore, met here, as did also the State convention which, on December 20, passed the first ordinance of secession. On April 12–13, 1861, the Civil War was opened by the Confederate bombardment and capture of Fort Sumter (q.v.) in Charleston harbor. In 1863 a Federal fleet under Admiral Dupont unsuccessfully attacked the fortifications of the harbor, and, though closely besieged and frequently bombarded, the city remained in possession of the Confederates until Feb. 17, 1865, when it was evacuated. On the following day the Union forces under General Gillmore took possession. On Aug. 31, 1886, Charleston suffered terribly from an earthquake shock, the severest in the history of the United States. Seven-eighths of the houses were rendered unfit for habitation, many persons were killed, and property valued at over $8,000,000 was destroyed. The damage, however, was quickly repaired. The South Carolina Interstate and West Indian Exposition (q.v.) opened here Dec. 2, 1901.

Consult: McCrady, *South Carolina under the Proprietary Government* (New York, 1897), *South Carolina under the Royal Government* (New York, 1899), and *South Carolina in the Revolution* (New York, 1901); also Powell, *Historic Towns of the Southern States* (New York, 1900), and Ravenel, *Charleston, the Place and the People* (New York, 1905).

CHARLESTON. The capital of West Virginia and the county seat of Kanawha County, about 369 miles west-northwest of Richmond, Va., on the Chesapeake and Ohio, the Kanawha and Michigan, the Kanawha and West Virginia, and the Coal and Coke railroads, and at the confluence of the Kanawha and Elk rivers (Map: West Virginia, C 3). The chief features are the capitol, customhouse, Federal building, public library, monument to Stonewall Jackson, and the county courthouse. The city has regular steamboat communication with the principal river ports, and is an important shipping point for coal, salt, and timber. There are deposits of natural gas, coal, and oil in the neighborhood. The manufactures include axes, glass, engines, boilers, furniture, carriages, fire brick, and lumber. Charleston has also boat-building yards and color and veneer works. The government is vested in a bipartisan board of affairs, consisting of the mayor and three commissioners, and a city council with limited power. A fort was built at Charleston about 1786; the town was incorporated in 1794, and the city in 1870. It has been the capital of West Virginia since 1870, with the exception of the period, 1875–85, when Wheeling was the seat of government. Pop., 1890, 6742; 1900, 11,099; 1910, 22,996.

CHARLESTON EXPOSITION. See SOUTH CAROLINA INTERSTATE AND WEST INDIAN EXPOSITION.

CHARLESTOWN. Formerly a city of Middlesex Co., Mass., now incorporated with Boston (q.v.). Charlestown was settled in 1629 by a small company from Salem and was organized as a town in 1634. The territory originally within its limits has from time to time been divided up to form the towns of Woburn, Malden, Stoneham, Burlington, and Somerville, and parts of Medford, Cambridge, Arlington, and Reading. The battle of Bunker Hill was fought here on June 17, 1775, when the British set fire to the town, destroying 320 buildings, valued at $525,000. The battle is commemorated by the Bunker Hill Monument (q.v.). Charlestown was chartered as a city in 1847. It contains a United States Navy Yard. It was the home of John Harvard, the earliest benefactor of Harvard College, and the birthplace of Samuel F. B. Morse, the inventor of the electric telegraph. In 1874, its population then being 23,373,

Charlestown was annexed to Boston. Consult: Frothingham, *History of Charlestown* (Boston, 1845); Hunnewell, *A Century of Town Life: A History of Charlestown from 1775 to 1887* (Boston, 1888); Sawyer, *Old Charlestown* (1902).

CHARLES TOWN. A city and the county seat of Jefferson Co., W. Va., 55 miles northwest of Washington, D. C., on the Baltimore and Ohio and the Norfolk and Western railroads (Map: West Virginia, G 2). It is the seat of Powhatan College and Stephenson Seminary, both for young women. The city is in a fertile agricultural district, has deposits of limestone and iron ore in the vicinity, and manufactures brass fittings, harness, collars, fly nets, various wooden products, and fertilizers. It is known as a summer resort. Charles Town was settled about 1750 and was first incorporated in 1873. It was here that John Brown, after his raid at Harper's Ferry, was tried, condemned, and hanged on Dec. 2, 1859. On Oct. 18, 1863, a Confederate cavalry division, under General Imboden, captured the place and secured 424 prisoners and large quantities of military stores, but, on the approach of a superior Union force, almost immediately withdrew. Pop., 1890, 2287; 1900, 2392; 1910, 2662.

CHARLES WILLIAM FERDINAND, Duke of Brunswick (1780–1806). See Brunswick, House of.

CHARLET, shär'lā', Nicolas Toussaint (1792–1845). A French lithographer and painter. He was born in Paris, studied with the painter Gros, and soon became renowned for his lithographed designs of military subjects, like the "Grenadier of Waterloo." He did not confine himself to lithograph subjects, but worked rapidly in water colors and in sepia and oil. Among his pictures in oil are the "Episode in the Retreat from Russia" (Lyons) and "Wounded Soldiers Halting in a Rain" (Valenciennes). He took delight in representing humorously rustic scenes of peasants and children and in attaching to these designs quaint descriptive mottoes. His last important work was his illustration of Napoleon's Diary at St. Helena. By his continual glorification of the First Empire he helped to awaken popular sentiment against the Bourbons, preparing the way for the revolution of 1830. About 1092 of his lithographs survive. Consult his biography by Lacombe (Paris, 1856); Dayot (ib., 1893); id., *Les peintres militaires Charlet et Raffet* (ib.).

CHARLEVILLE, shär'l'-vêl' (Fr., Charles's town). A town of France, on the Meuse, in the Department of Ardennes, opposite Mézières, with which it communicates by a suspension bridge over the Meuse (Map: France, N., K 3). It is a thriving place, well built, with clean spacious streets; it has a teachers' college, a lyceum, and a library. It still adheres to plans for streets and buildings laid down by its founder, Charles III, Duke of Nevers, in 1606. It manufactures hardware, leather, sugar, brushes, and beer, and the Meuse affords facilities for considerable trade in metals, coal, iron, slate, wine, and nails. Pop. (commune), 1901, 18,772; 1911, 22,654. It was the mediæval Arcæ Remorum and Carolopolis, and an important military station until the destruction of its fortifications in 1687.

CHARLEVOIX, shär'le-voi'. A city and the county seat of Charlevoix Co., Mich., 210 miles by rail north by east of Grand Rapids, on the Pere Marquette Railroad, and on the Pine River, which flows into Lake Michigan (Map: Michigan, D 3). It is a popular summer resort and has important fishing and lumbering interests. It manufactures cement, lime, and stone and lumber products. The United States Fish Hatchery has a substation here, and the city contains a Carnegie library and municipal electric light plant and water works. The city was chartered in 1905. Pop., 1900, 2079; 1910, 2420.

CHARLEVOIX, shär l'-vwä', Pierre François Xavier de (1682–1761). A French missionary and traveler, best known as the historian of "New France." He was born in Saint-Quentin, became a member of the Society of Jesus in 1698, and from 1705 to 1709 taught in Quebec, Canada. He then returned to France; but in 1720 was sent to America by the Duke of Orléans to gather information concerning the "Western Sea," then supposed to be only a short distance from the Mississippi River. Arriving at Quebec in September, he ascended the St. Lawrence and the Great Lakes as far as Michilimackinac, and, after questioning the Indians, reported that the Pacific could probably best be reached by way of the Missouri. He proceeded by way of Lake Michigan and the Illinois River to the Mississippi, descended in a small vessel to New Orleans, and, after suffering a shipwreck, went to the island of Santo Domingo, whence, in December, 1722, he returned to France. Subsequently he was sent on various missions by his order, and from 1733 to 1755 collaborated on the *Journal des Trévoux*. He is best known for his *Histoire et description générale de la Nouvelle France avec le journal historique d'un voyage fait dans l'Amérique septentrionale* (1744; Eng. trans. by J. G. Shea, 1865–72), which contains much valuable material. Among his other writings are: *Histoire et description générale du Japon* (1715); *Vie de la mère Marie de l'Incarnation* (1724); *Histoire de l'île espagnole, ou de Saint-Domingue* (1730); and *Histoire du Paraguay* (1756; Eng. trans., 1769).

CHARLOCK. See Mustard.

CHARLOTTE, shär-lŏt'. A city and the county seat of Eaton Co., Mich., 18 miles southwest of Lansing, on the Grand Trunk and the Michigan Central railroads (Map: Michigan, E 6). Charlotte contains a Carnegie library. It is of importance as a manufacturing centre, the principal products being furniture, automobiles, scythe swats, ball bats, horse pokes, bridges, and road culverts. There are also grain elevators and grist mills. Settled in 1835, Charlotte was incorporated as a village in 1863 and in 1871 as a city. The government is administered by an annually elected mayor and a council. The city owns and operates the water works. Pop., 1900, 4092; 1910, 4886.

CHARLOTTE, shär'lŏt. A city and the county seat of Mecklenburg Co., N. C., 174 miles by rail west by south of Raleigh, on the Southern, the Piedmont and Northern, the Norfolk Southern, and the Seaboard Air-line railroads, and on Sugar Creek (Map: North Carolina, B 2). It is in the gold region of the State, and a branch mint was established here in 1838. It was closed by the breaking out of the Civil War, reopened in 1869, and was made an assay office. The city has two colleges for women, a military institute, a Carnegie library, a library for the colored population, hospitals for white and colored persons, a United States courthouse, and Vance Park. Biddle University (Presbyterian), for colored students, opened

in 1867, is just outside the city limits. Charlotte is an important commercial and industrial centre. There are more than 300 cotton mills situated within 100 miles of the city. Iron, mill supplies, farm machinery, scales, caskets, show cases, leather belting, and clothing are manufactured also. There are in the city and vicinity several electric plants, which furnish power for manufacturing at a very low cost. The government, under a charter of 1866 and subsequent amendments, is vested in a mayor, biennially elected, and a council. There are municipal water works. Pop., 1890, 11,557; 1900, 18,091; 1910, 34,014.

Settled about 1750, Charlotte was incorporated in 1768 and in 1774 was made the county seat. The so-called Mecklenburg Declaration of Independence (q.v.) was adopted here on May 20, 1775, the signers of which are commemorated by a monument. In September, 1780, Lord Cornwallis entered Charlotte and occupied it for several days. He referred to it as a "hornet's nest," and this has since been adopted as the city's emblem. Later in the year General Gates made his headquarters here. The city was the last meeting place of the full Confederate cabinet. Consult W. H. Foote, *Sketches of North Carolina* (New York, 1846).

CHARLOTTE. 1. The daughter of Sir Jasper in Fielding's farce, *The Mock Doctor*. The character was suggested by Lucinde in Molière's *Médecin malgré lui*. 2. The gay fiancée of Cantwell, who later marries Darnley, in Bickerstaffe's *Hypocrite*, suggested by Marianne in Molière's *Tartufe*. 3. The simple wife of Albert, whom Werther loves, in Goethe's *Sorrows of Werther*. 4. The sweetheart of Wrangle in Cibber's comedy, *The Refusal*.

CHARLOTTE AMALIE, shär-lŏt' ä-mä'lē-e. The only town of the island of St. Thomas, in the West Indies (Map: West Indies, F 3). It has a spacious harbor, furnished with a floating dock for ships up to 3000 tons, and is an important coaling station. Pop., 1901, 8540.

CHARLOTTE HARBOR. A shallow inlet on the gulf coast of Florida, extending inland about 25 miles (Map: Florida, F 5). The inner harbor is about 10 miles wide at its widest part. The outer harbor is separated from the Gulf of Mexico by a line of keys which reduces the main entrance to the bay to a width of three-fourths of a mile. Pine Island partly divides the inner from the outer harbor. Wild waterfowl and fish are plentiful.

CHARLOTTENBURG, shär-lŏt'ten-bo͝orĸ (Ger., Charlotte's town). A prosperous town and residential suburb of Berlin in the western outskirts of the city (Map: Prussia, E 2). It is connected with Berlin by street railway, by the Stadtbahn and the Hochbahn (an elevated road). It has numerous educational institutions, including a gymnasium, high school, royal academy of music, royal academy of art, artillery and engineering school, technical academy, physical-technical institute, and a military preparatory school. The Technical Academy is a spacious and noteworthy building, containing statues and busts and a valuable architectural museum. A splendid municipal opera house was opened in 1912. The Schiller Theater and an equestrian statue of Emperor Frederick III are also interesting. The manufacturing interests of the city are important; chief among them is the Royal Porcelain Factory, founded in 1761. There are also iron foundries and manufactures of machinery, glass, pottery, electrical apparatus, dyes, wagons, woodworking machinery, asphalt, beer, paper, leather, and chemicals. Horses from the surrounding territory are marketed here. The palace, the main portion of which was finished by 1699, under Schlüter's direction, for Sophia Charlotte, second wife of Frederick I, consists of a group of buildings, with a garden laid out by the French landscape gardener Le Nôtre. The rococo ornamentations and the porcelain chamber are noteworthy. Emperor Frederick III was confined here during a part of his fatal illness. In the garden is the handsome Doric mausoleum, erected in 1810 by Gentze, according to the designs of Schinkel, containing the tombs of Frederick William III and Queen Louisa, and Emperor William I and Empress Augusta. Pop., 1890, 77,000; 1900, 189,305; 1910, 305,181. Consult Schultz, *Story of Charlottenburg* (Charlottenburg, 1888).

CHARLOTTESVILLE, shär'lŏts-vĭl. A city of Virginia, 182 miles by rail, and direct, 97 miles northwest of Richmond, on the Chesapeake and Ohio and the Southern railroads, and on Rivanna River (Map: Virginia, F 3). It is the seat of the University of Virginia (q.v.), founded by Thomas Jefferson, and of St. Anne's School for Girls, Jefferson School, Miller's Manual Training School, and the University Summer School. It contains also two hospitals and two sanitariums. Monticello, Jefferson's home, is but 3 miles distant, to the southeast. The city has woolen, flour, silk, and planing mills, tanbark, locust-pin, and cigar factories, wine presses, etc., and is in a rich agricultural and fruit-growing region. Settled as early as 1744, Charlottesville was chartered as a city in 1888. The government is administered by a city manager elected by the city council. The water works and gas plant are owned and operated by the municipality. Pop., 1890, 5591; 1910, 6765.

CHARLOTTETOWN, shär'lŏt-toun. Capital of Prince Edward Island, Canada, in Queen's County, situated on the south coast, on Hillsboro Bay, and at the confluence of three rivers (Map: Prince Edward Island, F 2). There is steamship connection with various Dominion ports. A railway and carriage bridge, half a mile long, spans the Hillsboro River east of the city. Charlottetown has a fine harbor. It stands on rising ground and is intersected by wide streets at right angles to each other. The Provincial Government and Dominion buildings, courthouse, Young Men's Christian Association building, Roman Catholic cathedral, public library, city hall, insane hospital, normal school, Prince of Wales College, and St. Dunstan's College are noteworthy features. The industrial establishments include iron foundries, railroad workshops, pork-packing, condensed-milk, woolen factories, etc. Agricultural produce and fish are exported. Charlottetown is the seat of a United States consul. Pop., 1901, 12,080; 1911, 11,203. Charlottetown was founded about 1767, the site having been selected in 1764 by Captain Holland, surveyor-general for eastern Canada. In 1775 the town was looted by two American privateers, an act which was condemned by Washington, who liberated the prisoners and restored their property. Canadian confederation originated at a conference held in 1864 in Charlottetown.

CHARLTON, John (1827–1910). A Canadian statesman. He was born near Caledonia, N. Y., and was educated at Springfield Academy.

He went to Ontario in 1849, was engaged for some years as farmer and merchant, and after 1861 acquired a considerable fortune in the lumber business. He was elected a Liberal member of the House of Commons for North Norfolk in 1872 and represented that constituency for 24 years. He commanded attention in the House and gained a high reputation in the country by his mastery of trade and tariff questions; but an exacting conviction that government should promote private and public morality and assure equal rights led him at times to take a legislative course in which he was in notable conflict with his party and a leader of a vigorous and discontented minority. During the agitation in 1885 and later over the execution of Louis Riel (q.v.) he supported the Conservative Premier, Sir John A. Macdonald. When dissatisfaction was aroused among the Protestant element by the Jesuit Estates Act (see MERCIER, HONORÉ), he was one of 13 members who in 1889 voted for a parliamentary resolution against the act: and among those who adhered to the Equal Rights' party, formed at that time, Charlton was a leader. Mainly through his efforts a measure, commonly known as the Charlton Act, was enacted for the protection of women and girls, in the case of the latter raising the age of consent to 16 years. He was a founder of the Dominion Lord's Day Alliance, an organization established in 1888. In the same year he was appointed chairman of the Ontario Mining Commission. He was a stanch advocate of reciprocity with the United States and in 1897 visited Washington in that behalf. He died at Lynedoch.

CHARM. See INCANTATION; MAGIC.

CHARMES, shärm, FRANCIS (1848–1916). A French editor, born at Aurillac. He was educated at the Collège d'Aurillac and the lycées of Clermont-Ferrand and Poitiers. From 1872 to 1880 and from 1889 to 1907 he was editor of the *Journal des Débats* and was also editor of the *Revue des Deux Mondes* from 1893 to 1907, when he became its manager. He held several offices in the Department of Foreign Affairs, was deputy for Contal in 1881–85 and 1889–98, and senator for Contal in 1900. In 1908 he became a member of the Academy. Besides his literary and political articles in the journals mentioned, he published *Etudes historiques et diplomatiques* (1892).

CHARMIDES, kär'mĭ-dēz (Lat., from Gk. Χαρμίδης) (c.450–404 B.C.). A pupil of Socrates, cousin of Critias, and maternal uncle of Plato, who introduces him in one of the *Dialogues.* He was one of the "Thirty Tyrants" at Athens in 404 B.C., but was slain the same year, while fighting against Thrasybulus. Consult Plato, *Charmides,* and Xenophon, *Memorabilia.*

CHARMIDES. One of the dialogues of Plato representing a conversation between Socrates, young Charmides, and two other Athenians on the subject of moderation.

CHARNAY, shär'nâ', CLAUDE JOSEPH DÉSIRÉ (1828–). A French traveler, born in Fleurieux, Rhône. In 1857, under the auspices of the French government, he began a long series of expeditions to Mexico and other parts of the world. With the further assistance of Pierre Lorillard, he in 1880 undertook the exploration and excavation of the ancient cities of Mexico. He made many important discoveries, the chief results of which are set forth in the collection at the Museum of the Trocadéro and in his work *Les anciennes villes du nouveau monde* (1884), of which an English translation appeared in 1887 (*The Ancient Cities of the New World,* by Mesdames Gonino and Conant; introduction by Allen T. Rice). He has also published: *Cités et ruines américaines* (1863), with an atlas; *A travers les forêts vierges* (1890); and *Histoire de l'origine des Indiens qui habitent la Neuvella Espanga selon leurs traditions* (1903).

CHARNEL HOUSE (OF. *charnel, carnel,* ML. *carnale,* charnel, from *caro,* flesh + *house*). A chamber situated in a churchyard or other burying place, in which the bones of the dead which were thrown up by the gravediggers were reverently deposited. The charnel house was generally vaulted in the roof, and was often a building complete in itself, having a chapel or chantry attached to it. In such cases the charnel vault was commonly a crypt under the chapel, and even in churches it was not uncommon for the vault or crypt to be employed as a charnel house.

CHARNISÉ, shär'nē'zā', CHARLES DE MENOU, SEIGNEUR D'AULNAY DE (c.1605–1650). A French proprietor in Acadia. In 1632 he accompanied the party under Isaac de Razilly which settled at La Have for the purpose of recovering the Acadian possessions of France. In 1635 Charnisé commanded an expedition to the Penobscot River, where he conquered the fort which had been built there by the Plymouth colonists, telling its defenders that in the following year he would annex the entire region to the fortieth degree, north latitude. After the death of Razilly (1636) Charnisé succeeded to the command and made Port Royal (Annapolis) the chief settlement of Acadia, then a vast territory embracing what is now New Brunswick and Nova Scotia and afterward extending to the Penobscot. He later captured Fort La Tour, and in 1645 went to France, where he was appointed Governor and Lieutenant General of Acadia by the government of Louis XIV (1647). As soon, however, as the charge of treachery reached the court, Charnisé was dismissed from office and superseded by La Tour. His widow married La Tour in 1653.

CHAR'NOCK, STEPHEN (1628–80). An English Puritan theologian, was born in the parish of St. Catherine Cree-Church, London, where his father was a solicitor. He was educated at Cambridge and at Oxford, and became proctor at the latter when Oliver Cromwell was Chancellor. He went to Ireland as chaplain to Henry Cromwell, Lord Deputy. In 1660 he was silenced by the Act of Uniformity and returned to London, where he preached for 15 years, but without a settled congregation. He was a man of great piety and vast learning. After his death his writings were published, the chief being *On the Excellence and Attributes of God* (1681–82). In 1860 Prof. James McCosh published an edition of Charnock's works, with a life of the author.

CHARN'WOOD FOREST. A forest in the northwestern part of Leicestershire, England. It lies on a gradual rise of ground culminating in Bardon Hill, which is 900 feet high.

CHARNY, COMTE DE. See CHABOT, P.

CHARON, kā'ron (Lat., from Gk. Χάρων, Etrusc. *Charun*). In classical mythology, the ferryman of the lower world, who conveys to the realm of Hades the souls of the dead that have been duly buried. He does not appear in

Homer or Hesiod, but was early prominent in popular belief and appeared in one of the lost epics, whence Polygnotus introduced him into his great painting of "Odysseus in the Lower World." From the fifth century B.C. Charon appears frequently in literature. He is also often represented on the Athenian white lecythi, vases buried with the dead, where he is depicted as a bearded old man wearing the short tunic and pointed cap of a seaman, in a skiff with a single oar. To pay the fare a small coin (*obolus*) was placed in the mouth of the dead; bodies with coins in the mouth have been found even in Switzerland and Italy. On Etruscan monuments Charon is represented as a demon of death, with bestial face, huge tusks, and pointed ears, carrying snakes or, more commonly, a large hammer. The bodies of fallen gladiators were dragged from the arena by a man disguised as this Etruscan demon. In modern Greece Charon survives as *Charos* or *Charontas*, who, as a black bird of prey or as a winged horseman, bears victims to the world of the dead. Consult Ambrosch, *De Charonte Etrusco* (Breslau, 1837), and Waser, *Charon, Charun, Charos* (Berlin, 1898).

CHARONDAS, kā-rōn'dăs (Lat., from Gk. Χαρώνδας). A Greek of the sixth century B.C., born at Catana, in Sicily, and mentioned, with Lycurgus, Solon, Zaleucus, and others, as a famous lawgiver. To him were ascribed the laws of the Chalcidian colonies in Sicily and Italy, praised by Aristotle as very carefully drawn. Certain citations from his works by Stobæus and Diodorus are to be assigned rather to later modifications of his work.

CHA'RON OF LAMP'SACUS (first half of fifth century B.C.). One of the earlier Greek historical writers, known as logographers (q.v.). He composed a history of Persia, from the point of view of Persia's relation to Greece, which probably included the story of the invasion of Xerxes. He wrote also a work called *Horoi*, dealing primarily with Lampsacus. Consult Kreuzer, *Historicorum Græcorum Antiquissimorum Fragmenta;* Müller, *Fragmenta Historicorum Græcorum* (Paris, 1841); Bury, *The Ancient Greek Historians* (New York, 1909).

CHARON'S (kā'ronz) **STAIRCASE** (trans. of Gk. Χαρώνειος κλῖμαξ, *Charōneios klimax*). A series of steps which led up to the stage (the acting place) in the Greek theatre, by which "the ghost" made his entrance. Consult Haigh, *The Attic Theatre* (3d ed., Oxford, 1907).

CHARPENTIER, shär'pän'tyā', François Philippe (1734–1817). A French mechanic, engraver, and designer. He was born in Blois and studied engraving in Paris. He invented the aquatint or nitric-acid process in engraving, but sold his secret to Count Caylus. The earliest engravings in aquatint made by him are the following: "Perseus and Andromeda," after Vanloo; "The Decapitation of John the Baptist," after Guercino; and "The Children's Bacchanal," after De Witt. As "royal mechanician" he afterward effected numerous improvements in the construction of lighthouses, war vessels, and firearms.

CHARPENTIER, Gustave (1860–). A French composer, born in Dieuze, Lorraine. He studied at the Paris Conservatory under Massart, Pessard, and Massenet, taking the Grand Prix de Rome in 1887. He wrote numerous songs and orchestral pieces and a symphonic drama, *La vie du poète*, produced at the Grand Opéra in 1892. But the most notable of his works is the opera *Louise*, of which he wrote both words and music, and which was produced in 1898 at the Opéra Comique. The scene is laid in modern Paris (in Montmartre), and the realism and dramatic power of the libretto, as well as the beauty and originality of the music, took Paris by storm and placed Charpentier in the front rank of the French "impressionists." *Louise* found its way into Germany, England, and the United States, meeting with considerable success. *Julien*, produced in 1913 (in the United States in 1914), was a distinct disappointment. Three other operas, *Marie*, *Orphée*, *Tête rouge*, have not yet been produced. In 1912 Charpentier was elected to a chair in the Paris Academy of Fine Arts.

CHARPENTIER, Johann Friedrich Wilhelm Toussaint (1738–1805). A German mining engineer. He was born in Dresden, studied law and mathematics at the University of Leipzig, and in 1766 was made instructor in mathematics at the Mining School of Freiberg, where he became interested in mining methods and metallurgy. As the introducer into Germany of the processes of amalgamation employed in Hungary and of various other improvements, Charpentier takes high rank among the German metallurgists of the eighteenth century. His scientific methods of mining as well as his geognostic investigations greatly stimulated the development of these branches in Germany. He wrote: *Mineralogische Geographie der kursachsischen Lande* (1778); *Beobachtungen über die Langerstatten der Erze hauptsachlich aus den sachischen Gebirgen* (1799); *Beitrage zur geognostischen Kenntnis des Reisengebirges schlesischen Antcils* (1804).

CHARPENTIER, Louis Eugène (1811–90). A French historical and genre painter. He was born in Paris and studied there under Gérard and Cogniet. He exhibited first in the Salon of 1831, "Bivouac of Cuirassiers," and afterward became known entirely as a painter of battle pictures in a large panoramic style with great attention to detail. In Versailles, where he became professor of design in 1876, there are several pictures by him—among them "The Battle of Moscow," "An Episode of the Siege of Antwerp," and "The Battle of Tchernaïa."

CHARPENTIER, Marc Antoine (1634–1704). A French composer, born in Paris. He studied under Carissimi in Rome and became chapelmaster to the Dauphin under Louis XIV. At the time of his death he was chapelmaster of the Sainte-Chapelle. He wrote only two operas, *Acis et Galathée* (1678) and *Médée* (1693). His fame rests principally upon his oratorios, of which he wrote 18 in the style of his teacher. One of these, *Le reniement de St. Pierre*, was revived with great success in Paris in 1903. Besides these he wrote 8 masses, 30 Psalms, 6 cantatas, numerous smaller sacred compositions, and some instrumental pieces

CHARPIE, shär'pē (Fr., from p.p. of OF. *charpir*, to pluck, from Lat. *carpere*, to seize). Ravelings of linen; lint. They were used by surgeons as a dressing for discharging wounds, ulcers, etc., before sterilized gauze came into vogue.

CHARRAS, shà'ràs', Jean Baptiste Adolphe (1810–65). A French military writer, born in Pfalzburg, Lorraine. He entered the artillery and engineering school in Metz, became an officer of artillery, served in Algeria, and in 1848 was appointed a lieutenant colonel and Undersecre-

tary of State in the Ministry of War. In the Assembly of 1848 and of 1849 he vigorously opposed the politics of Louis Napoleon and was banished after the coup d'état, thereafter residing in Belgium, Holland, and Switzerland. He wrote two valuable works, *Histoire de la campagne de 1815: Waterloo* (1858), and an incomplete *Histoire de la guerre de 1813* (1866).

CHARRETTE, shȧ'rĕt', THE KNIGHT OF THE (trans. of Fr. *Chevalier de la Charrette*). A contemptuous nickname earned by Lancelot in a French variation of the Arthurian legends. According to this version the knight, while galloping to the rescue of Guineveré, fell from his horse and was brought home in a cart (*charrette*). A modernized edition of Chrestien de Troyes's *Roman de la Charrette* appeared in Rheims, 1849, under the direction of Tarbe.

CHARRIERE, shȧ'ryâr', AGNÈS ISABELLE EMILE DE SAINT-HYACINTHE DE (1740–1805). A Swiss writer. She was born in Utrecht, the daughter of a Dutch nobleman. In 1771 she married M. de Charrière de Penthaz, a Swiss who had been her brother's teacher, and went to live at Colombier near Neuchâtel. As a writer she was entirely French in spirit. Under the pseudonym Abbé de La Tour, she published *Lettres neuchâteloises* (1784); *Caliste, ou lettres écrites de Lausanne* (1788)—her masterpiece—and *Les trois femmes* (1798). She also wrote some plays. She was on terms of close friendship with Madame de Staël and Benjamin Constant and was well known as a brilliant and beautiful woman.

CHARRON, shȧ'rôn', PIERRE (1541–1603). A French theologian and philosopher. He was one of the 25 children of a bookseller of Paris. He practiced law for a time in Paris, but, not having immediate success, he studied theology and rose to eminence as a preacher. In Bordeaux he formed a short but important friendship with Montaigne, who, on his death in 1592, requested Charron to bear the arms of the Montaigne family. In 1594 Charron published *Traité des trois vérités*, in which he dogmatically defended the Roman Catholic church. This was followed by a book of sermons, and in 1604 came his most remarkable work, *Traité de la sagesse*, in which he expressed skepticism with regard to science, but asserted the competence of reason to construct an adequate system of morality. Consult Liebscher, *Charron und sein Werk: De la sagesse* (Leipzig, 1890), and Vinet, *Moralistes de 16e et 17e siècles* (1904).

CHARRUA, chär-rōō'ȧ. A savage and warlike tribe formerly roving, without fixed homes, over all of modern Uruguay and somewhat beyond that. They were of dark complexion and heavily built, fought on horseback, and used the bolas. They had the custom of cutting off a finger joint on the death of a relative. They are now practically extinct. Their language, spoken also by the Bohanes, Chanes, Guenoas, Martidanes, Minuanes, and Yaros, constituted a distinct stock. According to Arâujo, "the last of the Charrûas," on exhibition in Paris in 1830, died there some time afterward. The Uruguayan "Gauchos" have a good deal of Charruan blood. Consult the article by Chamberlain on the Charruan stock in *American Anthropologist*, N. S., vol. xiii, pp. 468–471 (1911) and references there cited; also *Rev. de la Univ. de Buenos Aires*, vol. xxiv, pp. 231–237 (1913).

CHART (Fr. *charte*, charter, Lat. *charta*, paper, from Gk. χάρτη, *chartē*, paper). A marine or hydrographic map, exhibiting a portion of a sea or other body of water, with the islands, adjacent coasts, soundings, currents, etc. (See MAP.) Charts are made of convenient size and scale for the purpose desired and are usually constructed on the principle of Mercator's projection; charts of the oceans on the gnomonic projection are, however, published by the Hydrographic Office of the United States Navy for the convenience of navigators who wish to follow great-circle courses; and the coast and harbor charts of the United States, published by the United States Coast and Geodetic Survey, are on the polyconic projection. Charts are constructed with more accuracy than ordinary maps, and efforts are made to embody in them all the information possible. The meridians and parallels of latitude are drawn at convenient intervals, and on harbor charts the exact geographical position of some datum point is given. One or more compass roses (i.e., plans similar to the face of a compass card) are engraved in the chart where most needed, or where they will not interfere with soundings or other matters, and these show the magnetic variation, while the annual change is recorded in a note. In the case of harbor charts the rise and fall of the tide and lunitidal interval are given; this is important when the tidal range is considerable, for the depths, or soundings, recorded are based upon some particular state of the tide, usually that of mean low water. Shoals and shallow waters are indicated by dotted shading, or stippled tint, in order that their presence may more readily be noticed, and rocks are marked by crosses or other conventional signs. The soundings are expressed in fathoms or in feet, whichever will best serve in the particular locality, and a note under the title states which is used. The character of the bottom is indicated by symbols, giving the kind of material (sand, mud, rock) and its hardness, fineness, color, etc.

Lighthouses, buoys, beacons, and other aids to navigation are carefully shown in their proper position; and, when desirable to do so, the proper courses for entering or leaving a port or channel are indicated by broken lines, alongside which the compass courses are printed. The depths and coast line in nearly all parts of the world are constantly changing, as are the lighthouses, buoys, and aids to navigation. This requires unceasing watchfulness on the part of chart-issuing offices, and the correction of charts constitutes more than half the expense connected with their production and issue. Charts already printed and on the shelves of the issuing office are corrected by hand, several draftsmen being constantly engaged in the work. If, however, the correction in this manner takes more than a few minutes, the copies on the shelves are destroyed and a new edition printed with the correction embodied in the engraving. The sources of information for corrections are the reports from men of war or merchant ships, from lighthouse boards, inspectors of harbors, channels, and waterways, new surveys, and the like. These are embodied in *Notices to Mariners* and published at short intervals, usually once a week. The information is arranged in the most convenient manner possible for the use of navigators, the number of each chart affected by a note being stated. In addition to this, the notices give a list of charts of which new edi-

tions have been published or which have been extensively corrected.

For purposes of navigation the character of the projection (i.e., the plan by which the curved surface of the earth is represented on a plane) is most important. The Mercator projection is most used and decidedly the most popular. The meridians are rectilinear and parallel, and this enables the navigator to lay down the compass course as a straight line; and charts on this projection of the same scale and latitude may be joined at the edges. Neither of these important characteristics is possessed by the polyconic, which is best suited to the delineation of small areas such as harbors of moderate extent or certain types of ocean charts. The line of sight and the great-circle course are nearly straight lines on a polyconic chart, and areas and shapes near the central meridian are undistorted. The saving of distance through following great-circle arcs is very slight except on long voyages, and the conditions of average wind and weather are likely to reduce the value of the saving even then, because the great-circle arc, when it differs from the rhumb line (q.v.), always lies on the polar (and therefore usually the colder and stormier) side of it. Whether it is desirable to follow a great circle or not can readily be determined by comparing the course as laid down on a great-circle chart (gnomonic projection) with a wind, weather, and current chart, such as the pilot chart issued by the Hydrographic Office of the United States Navy. See PILOT CHART.

Charts are now chiefly printed from engraved plates (copper, except in France, where many soft steel plates are used), for various reasons, the principle of which is that it facilitates the introduction of new matter in certain parts without the necessity of reproducing the whole. To effect the correction the plate is turned face downward on a smooth anvil or hard surface, and the area to be reëngraved smoothed out and the metal brought up flush with the general surface of the plate by beating on the back over the predetermined area with a round-faced hammer. Preliminary charts, and others of temporary interest, of which the details do not change, are largely produced by photolithography. With this process tough, flexible paper cannot be satisfactorily used, and if a photolithographic chart is to be much handled it requires backing with cloth.

As already stated, there are in the United States two chart-making offices, the Hydrographic Office of the Navy, and the Coast Survey, the latter publishing charts (about 800) of the United States coast only; and the former, charts (about 2000) of the Great Lakes and of foreign territory and seas. The main office of each of these establishments is in Washington, but for the purpose of gathering and disseminating information of service to navigators, the Hydrographic Office has branches in all the principal seaports of the United States and several on the Great Lakes. It is likely that additional ones will soon be opened at Manila and Honolulu, with observing stations at Guam and Tutuila, when these can be reached by telegraph. In Great Britain the Hydrographic Office is under the Admiralty. Charts are also published by nearly all the European Powers, and by Brazil, Chile, and Japan, and there are several private makers who issue charts of special localities. The price of government charts is very low, barely sufficient to cover the cost of printing and paper.

CHARTA, kär'tȧ, MAGNA. See MAGNA CHARTA.

CHARTE, shärt (Fr., charter, from Lat. *charta*, paper). A French term, used especially to designate the constitution or organic law granted by Louis XVIII on his restoration in 1814. It was formerly written *chartre*. The word is an old one and applied to a large class of legal documents. Among the best known of the older chartes was the *Charte Normande* or *aux Normands*, containing the privileges granted to the Normans (1314–15) by Louis X. The Trésor des Chartes of France is one of the important bureaus of the national archives. The École des Chartes in Paris is the leading school of the world for instruction in the study of historical documents. The charte of 1814 has always been considered the fundamental law of constitutional monarchy when that form of government has existed in France. It was an act of royal grace and not in any sense a popular constitution or even a contract between king and people. This fact eventually led to the revolution of 1830. The charte sworn to on the 29th of August of that year by King Louis Philippe explicitly recognized the sovereignty of the people. This document, with some modifications, remained in force till the revolution of 1848. Consult Floquet, *Charte aux Normands, avec ses confirmations* (Caen, 1788).

CHARTER (OF. *chartre*, from Lat. *chartula*, dim. of *charta* from Gk. χάρτη, *chartē*, paper). A formal writing by which property is granted or rights and privileges are conferred. The term was formerly applied to a written conveyance of land, and property held under such an instrument was, in Anglo-Saxon law, called "charter-land," or "bookland." In this sense the word has given way to "deed."

The term "charter" is used to describe a grant of land, franchises, or other privileges by the state, or a solemn guaranty by the sovereign of popular rights. *Magna Charta*, or the great charter issued by King John in 1215, is one of the chief constitutional documents of Great Britain. It has been the custom of the British government for centuries to grant political charters to some of its colonies.

In American Colonial history grants of franchise, governmental privileges, and estates to companies for the purpose of establishing colonies, to the inhabitants of Colonies in general, or to individual proprietors, were embodied in charters. Of the first sort were the charters of Massachusetts Bay, granted by Charles I (1629), and the charter of Georgia, granted by George II (1732). Of the second sort was the charter of Connecticut granted to the people of the Colony by Charles II (1662). Of the third sort were the original charter of New York, granted to the Duke of York by Charles II (1664), and the charter of Maryland, granted to Lord Baltimore by Charles I (1632). Some of the Colonial municipal charters remain in force to the present day, but the general provisions of charters are of little use in the United States, as corporations are now created by the several legislatures or by Congress. Blackstone describes such charter governments as "civil corporations, with the power of making by-laws for their own interior regulations, not contrary to the laws of England; and with such rights

and authorities as are specially given them in their several charters of incorporation." Judge Story criticizes Blackstone's view, declaring that the charter Colonies of America "were great political establishments, possessing the general powers of government and rights of sovereignty, dependent indeed on the realm of England, but still possessing within their own territorial limits the general powers of legislation and taxation."

None of the British colonies are sovereign, their legislative authority being theoretically subordinate to the Imperial Parliament and government of Great Britain, which latter has a power of disallowance over the colonial legislation, exercisable within a limited period. This power has not been exercised as regards the Dominion of Canada for upward of 40 years. After the expiration of the time within which they are subject to disallowance, acts of the colonial legislatures possessing responsible government become just as much acts of the King as the statutes of the Parliament of Great Britain and Ireland.

In modern municipal law the term "charter" is most frequently used to denote the grant of a *franchise* by the sovereign power to a corporation. According to Blackstone, "the king's consent is absolutely necessary to the erection of any corporation, either expressly or impliedly given."

In the United States corporations are chartered, as a rule, by legislative act—either by a special statute which confers upon a particular corporation the special powers and privileges named therein, or under a general law which provides the method to be pursued by persons who would organize a corporation. In the latter case the articles of association, taken in connection with the provisions of the general statute, constitute the charter. If the corporation is a public one, such as a city, county, or town, its charter may be changed at will by the Legislature. Such a corporation is a mere agency of the State for the exercise of governmental powers within a particular area. It has no vested right to any of its powers or franchises. Its charter "is not a contract, but a law for the public good." On the other hand, the charter of a private corporation is a contract between the State and the corporators. As such, it is protected from repeal or modification by the provision of the Federal Constitution which declares that "no State shall . . . pass any . . . law impairing the obligation of contracts" (Art. I, Sec. 10). The State granting the charter may, however, reserve the right to alter, amend, or repeal it. Consult: MacDonald, *Select Charters of American History, 1606–1775* (New York, 1904); Dicey, *Lectures Introductory to the Study of the Law of the English Constitution* (5th ed., London, 1912); Cooley, *General Principles of Constitutional Law in the United States*. See CORPORATION.

CHARTERHOUSE' (a corruption of Fr. *Chartreuse*). The name applied in England to Carthusian monasteries. The first was founded at Witham, on the borders of Selwood Forest, in 1181, by King Henry II in fulfillment of a vow made on the occasion of his memorable penance at the tomb of St. Thomas of Canterbury. The second was at Hinton in Somersetshire (1222); the third at Beauvale, Nottinghamshire (1343); the fourth, and most famous, to which the name is restricted in general usage, was situated in London. It was endowed by the will of Michael de Northburgh, Bishop of London, 1355–61, and the monks took possession of it in 1371. Its history is not of much general interest until the reign of Henry VIII, when in 1535 and the following years a number of the monks suffered death for refusing to acknowledge the royal supremacy in spiritual matters, the prior, John Houghton, being the first martyr for the old faith under the Reformation. The monastery was dissolved in 1538. The house passed through various hands, returning to the crown under Mary by the attainder of the Duke of Northumberland, and under Elizabeth by that of the Duke of Norfolk. The latter's son, the Earl of Suffolk, sold it in 1611 for £13,000 to Sir Thomas Sutton, whose coal lands in Durham had made him one of the richest Englishmen of his day. He richly endowed it as a hospital or almshouse for poor old men and a free grammar school, "to feed, clothe, and educate a certain number of poor boys, who without such assistance would be likely to go untaught." The "poor brethren" were 80 in number, none being admitted under 50 years of age; they must be bachelors and members of the Church of England. Each had a separate apartment, a share of attendance from domestics, and ample though plain diet, and an allowance of about £26 a year for clothes and pocket money. This part of the institution is best known by the famous description of it given in *The Newcomes* by Thackeray, who was himself educated at Charterhouse. The school was not long limited to the 40 foundation scholars, and grew until at the present time it ranks among the great public schools of England. Among the eminent men who have been educated here are Blackstone, Addison, Steele, John Wesley, and George Grote. In 1872, the old location amid crowded streets being thought unhealthful, the school removed to Godalming, in Surrey, 30 miles from London. The old premises were sold to the Merchant Taylors' School, which is now installed here in handsome new school buildings erected in 1875. The quaint old hospital and chapel, the latter containing Sutton's tomb, still remain as the home of aged pensioners. Consult: Hendricks, *The London Charterhouse* (London, 1889); Haig Brown, *Charterhouse, Past and Present* (Godalming, 1879); Eardley-Wilmot and Streatfield, *Charterhouse, Old and New* (London, 1894); Tod, *Charterhouse* (London, 1900); Doreau, *Henri VIII et les martyrs de la Chartreuse de Londres* (Paris, 1891); Wilmot and Streatfield, *Charterhouse Old and New*, with etchings by D. Y. Cameron (Stirling, Scotland, 1910); Taylor, *Charterhouse of London* (New York, 1912); Champney, "Charterhouse," in *Architectural Review*, vol. xi (1902).

CHARTERIS, ARCHIBALD HAMILTON (1835–1908). A Scottish clergyman and educator. He was born in Wamphray, educated in Edinburgh, Tübingen, and Bonn, and in 1863 was appointed minister of the Park Parish, Glasgow. He was professor of biblical criticism at Edinburgh from 1868 to 1898, when he became professor emeritus. He was a royal chaplain in 1869, and in 1892 moderator of the General Assembly of the Church of Scotland. In 1901 he was appointed chaplain in ordinary to the King in Scotland. His publications include a *Life of Professor James Robertson* (1863), *Canonicity* (1881), *A Faithful Churchman* (1897), and *The Church of Christ* (1905).

CHARTER OAK. A large tree that stood

in Hartford, Conn., until blown down, August, 1856, when its age was computed to be nearly 1000 years. The tradition relating to it is as follows: When Sir Edmund Andros was appointed Governor-General of New England, he came to Hartford in 1687 to receive the Colonial charter. This the colonists were loath to surrender, but, appearing to submit, carried it to the council chamber, where during the debate the lights were extinguished and in the ensuing confusion the document was carried from the room to its subsequent hiding place in the hollow of the tree. Here it remained until 1689, when the deposition of Andros made further concealment unnecessary.

CHARTER PARTY (Fr. *charte partie*, divided deed, one part being given to each party concerned; cf. *indenture*). In maritime law, a contract under seal by the owner or master of a ship, to carry a complete cargo of goods or to furnish a vessel or part of a vessel for that purpose. It is one form of the contract of *affreightment* (q.v.), the other being the familiar *bill of lading* (q.v.), which is employed when goods are shipped to form only a part of an intended cargo. Such a charter may operate as a lease of the ship itself, which thereupon passes under the control of the charterer; or, more commonly, it confers upon the shipper the right to have his entire cargo conveyed in the chartered vessel, in which case the charterer acquires no property right in the ship, nor any voice in its management. In the latter form of charter party the master or owner of the vessel occupies the position of a common carrier (q.v.); but where the charter transfers the possession and control of the ship, the master is the agent of the charterer, who becomes responsible for his acts and for those of the crew, and who, in the event of the chartered ship's earning salvage, becomes entitled to the salvage award.

The ordinary charter party describes the parties, the ship, and the voyage, stipulates that the ship is seaworthy, and will receive the cargo and perform the voyage promptly, and notes those perils of the sea for which the master and shipowner will not be responsible. On the part of the freighter, it stipulates to load and unload within a given time, with an allowance of so many lay or running days for loading and unloading the cargo, and the rate and time of payment of the freightage, and date of commencement of demurrage. Consult Scrutton, *Contracts of Affreightment as Expressed in Charter Parties and Bills of Lading* (4th ed., London, 1899).

CHARTIER, shär'tyā', ALAIN (c.1390–c. 1440). A French poet and diplomatist of very great literary influence in the fifteenth century, but since then almost forgotten save for the famous kiss bestowed—as legend will have it, in spite of chronology's proofs to the contrary—by Margaret of Scotland, wife of Louis the Dauphin, afterward Louis XI, on the lips of the sleeping poet, who is said to have been the ugliest man of his day. He studied in Paris, served Charles VI in important negotiations, and Charles VII as notary and financial secretary, as well as on a mission to Scotland. That he was Archdeacon of Paris, as asserted in an eighteenth-century epitaph and as generally believed, is, like the story of the kiss, proved false by chronology. Passages of his *Bréviaire des Seigneurs* were set to be learned by heart by court pages; Marot and Saint-Gelais, poets of the second following generation, praise him warmly; the English Lydgate studied and imitated him. His poems are mainly of lovers' controversy, but his *Livre des quatre dames* and *Le quadrilogue invectif* (1422) were evoked by the disasters of Agincourt and show a fine patriotic spirit. His *Lay de la belle dame sans merci* suggested at least a title to Keats. His work shows a boldness and freedom of thought that foreshadow the Renaissance. His works (Paris, 1617) were edited by A. Duchesne. Consult Delaunay, *Etude sur Alain Chartier* (with extracts from his writings, Paris, 1876), and Joret-Desclosières, *Alain Chartier* (1897).

CHARTISM. A Radical reform movement in England which reached its culmination in the period from 1838 to 1848. Its name originated in the *National* or *People's Charter*, which embodied the scheme of reform under six specific titles: (1) the right of voting to every male and every naturalized foreigner resident in the kingdom for more than two years, who should be 21 years of age, of sound mind, and unconvicted of crime; (2) equal electoral districts; (3) vote by ballot; (4) annual parliaments; (5) no property qualification for members; (6) payment of members of Parliament for their services. The Reform Bill of 1832 had failed to satisfy the working classes, and, after a period of terrible commercial depression and want, an unsuccessful attempt was made to institute a more thoroughgoing reform. Upon the failure of this movement six members of Parliament and six workingmen drew up the charter, which was hailed by large numbers of persons with enthusiasm. Immense meetings were held throughout the country, many of them attended by 200,000 or 300,000 people. Fiery orators fanned the excitement, and physical force was spoken of as the only means of obtaining justice. The more moderate were overruled by the fanatics, and the people, aroused by suffering, were easily wrought into frenzy by those who assumed direction. The Chartist propaganda was vigorously carried on by Feargus O'Connor in the *Northern Star*, an organ which attained a circulation of over 50,000. A body calling itself the National Convention, elected by the Chartists throughout the kingdom, commenced sitting in Birmingham in May, 1839. It proposed various means of coercing the legislature into submission, recommending a run on the savings banks for gold, abstinence from excisable articles, exclusive dealing, and, as a last resort, universal cessation from labor. During its sitting a collision took place with the military in Birmingham. Public meetings were forbidden, and alarming excesses were committed by the irritated mob. In June, 1839, a petition in favor of the charter was presented to the House of Commons, ostensibly signed by 1,280,000 persons. The House refused to name a day for its consideration, and the National Convention retaliated by advising the people to cease from work throughout the country. This advice was not followed, but the disturbance increased, and in November an outbreak took place in Newport, which resulted in the death of 10 persons and the wounding of great numbers. In 1842 great riots took place in the northern and midland districts, not directly caused by the Chartists, but encouraged and aided by them after the disturbances began. In the same year an attempt was made by Joseph Sturge to unite all friends of popular enfranchisement in a complete

suffrage union, but he succeeded only in dividing their ranks. In 1848 the turmoil in France created great excitement in England, and much anxiety was felt lest an armed attempt should be made to subvert the institutions of the country. Two hundred thousand special constables were enrolled in London alone, among which number was the subsequent Emperor, Napoleon III.

Adopting the language of Charles I, the opponents of Chartism denied that men *as such* had a right to vote; their right was to be well governed, and universal suffrage was more likely to destroy society than to confer happiness or insure justice. From 1848 Chartism as an organized movement disappeared, owing to the improvement in the circumstances of the people which followed the repeal of the corn laws. The Chartist leaders included Feargus O'Connor, Attwood, Lovett, Stephens, Vincent, Ernest Jones, and Thomas Cooper. Consult: *Life of Thomas Cooper: An Autobiography* (London, 1880); Carlyle, *Chartism* (London, 1839); Kingsley, *Alton Locke* (London, 1856); Gammage, *History of the Chartist Movement* (London, 1894); Dierlamm, *Die Flugschriftenlitteratur der Chartistınbewegung und ihr Widerhall in der öffentlichen Meinung* (Leipzig, 1909); Dolléans, *Le chartisme* (Paris, 1912).

CHARTOPHYLAX. See CHARTULARY.

CHARTRAN, shär'trăN', THÉOBALD (1849–1907). A French portrait and historical painter. He was born in Besançon, studied under Cabanel at the Ecole des Beaux-Arts, winning the Prix de Rome in 1877. Since 1872 he had exhibited at the Salon a series of historical pictures, such as "Joan of Arc" and "Angelica and Roger," which had attracted much attention. While in Rome he painted "The Vision of St. Francis of Assisi" (Museum, Carcasonne) and other religious pictures. After his return to Paris in 1883 he devoted himself almost exclusively to portrait painting, in which line he achieved great celebrity. Towards the end of his life he passed a part of each year in New York, and many members of the social and political world of America were among his sitters. Some of his most celebrated portraits are those of Mounet Sully as Hamlet, Sarah Bernhardt, Leo XIII, President Carnot, President Roosevelt (1903), Mrs. Roosevelt, and Miss Alice Roosevelt, President McKinley, Admiral Dewey, Secretaries Root and Knox, Andrew Carnegie, and Cardinal Gibbons. His "Signing of the Peace Protocol at Washington," an episode of the Spanish-American War, was presented to the United States government by Mr. H. C. Frick of Pittsburgh. His portraits are distinguished by able technique, refined manner, and subtle characterization. He also painted decorations for the Sorbonne, the Hôtel de Ville, and other public buildings in France. Consult Jules Martin, *Nos peintres et sculpteurs* (Paris, 1897).

CHARTRE. See CHARTE.

CHARTRES, shär'tr' (ML. *Carnotum*, Lat. *Carnutum civitas*, Gall. *Autricum*). A city of France, capital of the Department of Eure-et-Loir, and seat of a bishopric, 47 miles southwest of Paris (Map: France, N., G 4). It is built partly at the base and partly on the declivity of a hill overlooking the river Eure, thus consisting of an upper and a lower town connected by streets almost inaccessible to carriages. The upper town has some good streets, but the lower is ill built. Many of the houses are quaintly gabled, timbered buildings. The cathedral of Notre Dame, one of the largest and most imposing cathedrals in Europe, with lofty spires, one of them towering to a height of 413 feet, crowns the top of the hill. It has numerous stained-glass windows, the workmanship of which is unsurpassed, if indeed equaled, elsewhere in France, many of them dating from the thirteenth century. It is also famous for its sculptures. This splendid edifice was the source of inspiration for James Russell Lowell's poem "The Cathedral." The church of Saint-Pierre and the obelisk to the memory of General Marceau are also objects of interest. Chartres has manufactures of woolens, hosiery, and leather, and is the great cattle and grain market of the fertile plain of Beauce and the department. It has a chamber of commerce and a branch of the Bank of France. It has two teachers' colleges, a lyceum, a library of 127,409 printed volumes, a museum, and a botanical garden. Pop. (commune), 1901, 23,431; 1911, 24,103. The city, founded by the Carnutes, is one of the most ancient of France. In mediæval times it was the capital of the Province of Beauce. On several occasions it was besieged by Normans and Burgundians. Francis I conferred upon it the dignity of a duchy, and the title since 1661 has been connected with the Orléans family. Chartres was taken by the English in 1417 and recovered in 1432. It was captured by Henry IV in 1591 and witnessed his coronation in 1594. In 1870 it was occupied by the Germans and formed their base of operations against the army of the Loire. Consult: Doyen, *Histoire de Chartres* (2 vols., Chartres, 1786); Duval, *La cathédrale de Chartres* (Paris, 1867); Joanne, *Chartres* (Paris, 1887); Bulteau, *Monographie de la cathédrale de Chartres* (1887); Plerval, *Chartres, sa cathédrale, ses monuments* (1896); Massé, *Chartres: Its Cathedral and Churches;* Adams, *Mont Saint Michel and Chartres* (Boston, 1913).

CHARTRES, ROBERT PHILIPPE LOUIS EUGÈNE FERDINAND D'ORLÉANS, DUKE OF (1840–1910). A French soldier, the second son of the Duke of Orleans (died 1842), and the grandson of Louis Philippe. He was born in Paris, but when only eight years of age was driven into exile by the Revolution of 1848, and subsequently lived in Germany and England until 1858, when he entered the military school in Turin, Italy. In 1859 he served in the campaign against Austria, and in 1861 went to America with his eldest brother Louis, Count of Paris (q.v.), entered the Federal army, and served on General McClellan's staff during the Peninsular campaign. He returned to England in 1863 and there, in the following year, married his cousin, the eldest daughter of the Prince de Joinville. After the revolution of Sept. 4, 1870, in France, he served for two years in General Chanzy's army under the pseudonym of "Robert le Fort" and before the close of the war had risen successively to the ranks of captain and chief of squadron. He became chief of squadron in the Chasseurs d'Afrique, under his own name, in 1870, served in Algeria, and was appointed colonel of chasseurs in 1878, but in 1883 was suspended from the active service. In 1886 his name was stricken from the army list by a law excluding members of royal families from serving in the army or the navy. He published *Souvenirs de voyages* (1869).

CHARTREUSE, shär'trēz'. A liqueur, named

from the fact that it was made at the Carthusian monastery, La Grande Chartreuse, but when the Carthusian monks were driven out of France in 1903, the secret of its preparation was taken with them to Tarragon, Spain, where it is now prepared. The formula for the preparation is said to be known only to the Father Superior of the order. Three qualities are made—green, yellow, and white. Chartreuse is said to be a most complex product, resulting from the maceration and distillation of balm leaves and tops as a principal ingredient, with orange peel, dried hyssop tops, peppermint, wormwood, angelica seed and root, cinnamon, mace, cloves, Tonquin beans, *Calamus aromaticus*, and cardamoms.

CHARTREUSE, La Grande. A celebrated monastery in France, near Grenoble, in the wild and romantic valley of the Guiers, 3205 feet above the sea. It owed its origin to St. Bruno, the founder of the Carthusian Order, which took its name from a neighboring hamlet. (See Carthusians.) The convent building is a huge structure of no architectural beauty, dating mostly from 1676. The whole neighborhood at one time belonged to the monks, but they were despoiled by the Revolution. At Fourvoire, about 4 miles down the valley, they manufactured the celebrated liqueur which took its name from the monastery. In accordance with the Law of Associations of 1901, dealing with the control of religious congregations, the monks applied to the government for legal authorization. This was refused, and in 1903 the members of the order were expelled from the country and sought refuge in Spain, Italy, and Switzerland.

CHARTREUSE DE PARME, de pärm, La. The title of a French novel (1839), by Stendhal (Henri Beyle), presenting an admirable picture of life at one of the petty courts of Italy after the downfall of Napoleon.

CHARTULARY, kär'tû-lā-rĭ (Lat. *chartularia*, from *charta*, a paper). A collection of charters. So soon as any body, ecclesiastical or secular, came to be possessed of a considerable number of charters, obvious considerations of convenience and safety would suggest the advantage of having them classified and copied into a book or roll. Such book or roll has generally received the name of a chartulary. Mabillon traces chartularies in France as far back as the tenth century, and some antiquarians think that chartularies were compiled even still earlier. But it was not until the twelfth and thirteenth centuries that chartularies became common. They were kept not only by all kinds of religious and civil corporations, but even by private families. Many of them have been printed. For the English reprints, see Grass, *Sources and Literature of English History* (London, 1900). The name "chartulary" was also applied in western Europe to a registrar or keeper of records, who was known as "chartophylax" in the Eastern church and empire.

CHARYBDIS, kȧ-rĭb'dĭs. See Scylla and Charybdis.

CHASE, Frederick Lincoln (1865–). An American astronomer, born at Boulder, Colo. He was educated at the University of Colorado and at Yale University. He became assistant astronomer in 1891 and acting director in 1910 of the Yale Observatory. Besides articles in the *Astronomical Journal*, he wrote "Heliometer Triangulation of the Victoria Comparison Stars" in *Annals of the Cape Observatory* (1897); and "Triangulation of the Principal Stars of the Cluster in Coma Berenices" (1896), "Parallax Investigations on 163 Stars mainly of Large Proper Motion" (1906), and "Parallax Investigations on 41 Southern Stars mainly of Large Proper Motion" (1912) in the *Yale University Observatory Series.*

CHASE, George (1849–). An American law teacher and writer. He was born in Portland, Me., graduated at Yale in 1870 and at the Columbia Law School in 1873. He became assistant professor of municipal law at Columbia in 1875 and in 1878 professor of criminal law, torts, and procedure. In 1891 he organized and became the first dean of the New York Law School. He edited Chase's *Blackstone's Commentaries* (1876); Stephen's *Digest of the Law of Evidence* (1886); Johnson's *Ready Legal Adviser* (1881); *Leading Cases upon the Law of Torts* (1904); *Chase's Pocket Code* (1911).

CHASE, Philander (1775–1852). A Protestant Episcopal bishop and educator. He was born in Cornish, N. H., graduated at Dartmouth in 1795, and was ordained a deacon of the Protestant Episcopal church in 1798. He labored as a missionary in western New York and in 1811 became rector of Christ's Church, Hartford, Conn. In 1817 he went to Ohio, where two years later he laid the foundation of Kenyon College and Gambier Theological Seminary, of which he was first president. In 1835 he became Bishop of Illinois, where he was instrumental in founding Jubilee College, at Robin's Nest, and in 1843 he became the presiding Bishop of the church. Among his works are: *A Plea for the West* (1826); *The Star in the West, or Kenyon College* (1828); *Defense of Kenyon College* (1831); *A Plea for Jubilee* (1835); *Reminiscences* (1848).

CHASE, Pliny Earle (1820–86). An American scientist. He was born in Worcester, Mass., and educated at Harvard University, graduating in 1839. He engaged in teaching and business in Philadelphia until 1871, when he became professor of logic and philosophy in Haverford College. He investigated many problems in physics and celestial mechanics and was the author of *Elements of Meteorology* (1884). For an investigation on gravity he received the Magellanic gold medal of the American Philosophical Society in 1864 and was a vice president of this organization as well as a member of many scientific societies, both European and American.

CHASE, Salmon Portland (1808–73). An American statesman. He was born in Cornish, N. H., Jan. 13, 1808, and was a nephew of Bishop Chase, who supervised his earlier education in Ohio. He graduated at Dartmouth College in 1826, opened a school for boys in Washington, D. C., where he studied law under William Wirt; was admitted to the bar in 1829, and began to practice in Ohio, where almost his earliest work was the preparation of an edition of the statutes of Ohio with annotations, and a sketch of the history of the State. This work assisted him in gaining practice, and in 1834 he was appointed solicitor in Cincinnati for the Bank of the United States. His first effort in a cause touching slavery was in defense (1837) of a colored woman claimed as a fugitive and of James G. Birney (q.v.) for harboring her. This was the celebrated Matilda case. He

maintained that the Fugitive Slave Law (q.v.) of 1793 was void, because unwarranted by the Federal Constitution, and argued that slavery was a local institution; and that, as the slave had been brought into a free State by her master, she was in fact free. In 1847, in the Van Zandt case, before the United States Supreme Court, he took the ground that under the Ordinance of 1787 (q.v.), no fugitive from service could be reclaimed from Ohio unless he had escaped from one of the original 13 States; that it was the understanding of the framers of the Constitution that slavery was to be left to the disposal of the several States, without sanction or support from the Federal government; and that the clause in the Constitution relating to persons held to service was a compact between the States, conferring no power of legislation on Congress and never intended to confer such power. Chase also took part in many other cases involving the constitutionality of the Fugitive Slave Law and came to be known among the slaveholders of Kentucky as the "attorney-general of fugitive slaves." Being in active correspondence with editors, clergymen, and politicians engaged in the antislavery movement, he soon became a recognized leader of the cause in Ohio. Although favoring the abolition of slavery, he differed radically from Garrison both as to methods of effecting that end and as to the relation of such movements to the existing law of the land. He voted for Harrison in 1840; but after the death of the President, when it became clearly apparent that the Whig party could never be made a party of freedom, he withdrew from it in 1841 and was thereafter prominent as a member of the Liberty party in Ohio, which he helped to organize. He took part in the National Liberty Convention in Buffalo in 1843 and subsequent conventions, until the nomination by the Free-Soilers (in 1848) of Martin Van Buren for President; was a leading member and in most cases directed the proceedings. He was frequently called upon to prepare formal addresses and platforms for his party and in particular was the author of the Liberty Platform of 1843, the Liberty Address of 1845, the resolutions of the People's Convention of 1847, and the Free-Soil Platform of 1848. In February, 1849, he was chosen United States Senator from Ohio, his vote coming from all the Democrats and from a few of the Free-Soil members. In the Senate he was an outspoken opponent of slavery extension, and he refused to accept Clay's compromise measures in 1850. Though under obligations to no one party for his election, he usually acted with the Democrats, until the nomination, in 1852, of Pierce on a strongly proslavery platform, when he withdrew and undertook the formation of an independent Democratic party.

Remaining in the Senate entirely independent of party relations, he became, even at the side of Sumner and Seward, the leader of the opposition to the Kansas-Nebraska Bill (q.v.), and, acting with Giddings and Sumner, he sent out the historic "Appeal of the Independent Democrats in Congress to the People of the United States," which, published in the New York *Times* of Jan. 24, 1854, has been regarded as the earliest draft of the Republican party creed. In 1855 the "anti-Nebraska" elements in Ohio fixed upon him as their candidate for Governor, and after a vigorous and close contest he defeated the candidate of the Old Democrats and brought Ohio into line as a probable Republican State in the campaign of 1856. In that year Chase was put forward as a candidate for the Republican nomination for the presidency, but he withdrew his name. In 1857 he was re-elected Governor of Ohio and became recognized thenceforth as a leader in the new national party. During his service as Governor he was much occupied with matters connected with the slavery problem, and at the expiration of his term he was (in February, 1860) elected again to the Senate for the term beginning March 4, 1861. He was one of the candidates for the Republican nomination for the presidency in 1860, and, failing to secure it, he was later appointed by Lincoln Secretary of the Treasury. In that office, which he held until June, 1864, when he resigned owing to differences between himself and President Lincoln, Chase rendered important public service. The maintenance of national credit and the supply of funds with which to prosecute the war, the provision and regulation of a currency system, the creation of a national banking system, and the administration of a national finance under conditions never before experienced or anticipated, mark these years as the most important in the history of the department and distinguish Chase as one of the great secretaries of the Treasury.

In the autumn of 1864 Chief Justice Taney died, and Chase was appointed as his successor in December of that year, retaining the office through a period in which were handed down a series of decisions second in importance only to those of Marshall. Chase dissented from the court's decision in the Milligan case and in the so-called Slaughterhouse cases; he wrote the decision in Hepburn *v.* Griswold, which held that the Legal-Tender Act, so far as it compelled the acceptance of paper money in payment of debts antedating the statute which provided for such money, was unconstitutional. The effect of this was naturally to disprove an important part of Chase's work as Secretary of the Treasury; and this decision against his own work was soon afterward, in the Legal-Tender cases, reversed by a slightly reorganized court. He also wrote the opinion in the case of Texas *v.* White, in which the nature of the Union and the effect thereon of the Civil War were clearly expounded, the nation being characterized as "an indestructible Union composed of indestructible States." As Chief Justice, Chase presided over the impeachment trial of President Andrew Johnson. He became separated from the Republican party and was in 1868 a candidate for the Democratic nomination for the presidency, while his willingness to secure the same nomination in 1872 emphasized the weakness of his position. There is no doubt that as early as 1864 he set his heart upon a presidential nomination and that he had to some extent intrigued against Lincoln, even while sitting in his cabinet. In 1870 he was stricken with paralysis, from the effects of which he died, May 7, 1873, in New York. For his biography, consult: Warden (Cincinnati, 1874), a work undertaken at Chase's own request; Schuckers (New York, 1874); and for a recent and authoritative *Life*, Hart (Boston, 1899), in the "American Statesmen Series"; also, "Diary and Correspondence," in the *American Historical Association Annual Report for 1902*, vol. ii (Washington, 1903).

CHASE, SAMUEL (1741–1811). An American

jurist, one of the signers of the Declaration of Independence. He was born in Somerset Co., Md., studied law in Annapolis, was admitted to the bar in 1761, soon attained a considerable practice, and became prominent in Colonial politics. He served for more than 20 years in the General Assembly of Maryland; was prominent as one of the "Sons of Liberty" during the Stamp Act excitement; was one of the framers of the "Declaration of Rights of Maryland"; and from 1774 to 1778 and from 1784 to 1785 was a member of the Continental Congress. In 1776 he was associated with Franklin and Carroll in an unsuccessful mission to secure the good will of Canada and soon after his return advocated and signed the Declaration of Independence. As agent for the State of Maryland, he went to England in 1783 to recover the value of stock held by it in the Bank of England before the outbreak of the war and after remaining a year succeeded in obtaining about $650,000. In 1788 he was a member of the convention which ratified the Federal Constitution for Maryland, but was himself, along with Luther Martin, opposed to that document. He was appointed judge of the General Court of Maryland in 1791 and judge of the Criminal Court for Baltimore County in 1793 and in 1796 became an associate justice of the United States Supreme Court. As a judge, though frequently presiding with firmness and ability, he was unable to suppress or conceal his decided political predilections and on various occasions delivered what his political opponents regarded as partisan harangues to the grand jury. A harangue in Baltimore attracted the notice of prominent Democrats, who were then engaged in a general movement to diminish the influence of the judiciary, and, on John Randolph's motion, the House of Representatives passed a resolution of impeachment in 1804. In the following year the trial was conducted with much ceremony before the Senate, Chase being represented by Luther Martin, R. G. Harper, Charles Lee, P. B. Key, and Joseph Hopkinson, and the prosecution by John Randolph, G. W. Campbell, Joseph Nicholson, C. A. Rodney, John Boyle, Peter Early, and Christopher Clark. By the latter, eight articles were exhibited, two setting forth Chase's oppressive treatment of Fries, two more charging similar treatment of Callender, two others charging an infringement of the laws of Virginia in the Callender case, one relating to alleged unbecoming and unfair conduct before a Delaware grand jury, and the last calling Chase to account for his harangue before the Baltimore grand jury. Chase was finally acquitted on all but two charges—partisanship in the Callender trial and "electioneering" before the Baltimore grand jury—and no article received the two-thirds vote requisite for impeachment. This decision has been regarded as of considerable significance in the history of the American judiciary, inasmuch as it served to discountenance impeachment trials unless based on really serious grounds, and at the same time warned judges to suppress all manifestations of partisanship on the bench. "The case," says Henry Adams, "proved impeachment to be an impracticable thing for partisan purposes, and it decided the permanence of those lines of constitutional development which were a reflection of the common law." After the trial Chase continued to serve as a member of the Supreme Court until his death, June 19, 1811. Consult: an article "The Impeachment Trial of Judge Samuel Chase" in the *American Law Review*, vol. xxxiii (St. Louis, 1899); Smith and Lloyd (reporters), *The Trial of Samuel Chase* (Washington, 1805); Adams, *History of the United States* (New York, 1889).

CHASE, THOMAS (1827–92). An American educator, born in Worcester, Mass. He graduated in 1848 at Harvard University, studied at the University of Berlin and the Collège de France, and was professor of Greek and Latin at Haverford College in 1855–75. From 1875 to 1886 he was president of Haverford. He was a member of the American committee for the revision of the New Testament and a delegate to the Stockholm Philological Congress of 1889. He published: *Hellas: Her Monuments and Scenery* (1863); a *Latin Grammar* (1882); editions of *Cicero on Immortality* (1881), *The Æneid* (1868); *Horace* (1869); *Four Books of Livy* (1872); *Juvenal* and *Persius* (1876).

CHASE, WILLIAM MERRITT (1849–1916). An American landscape, portrait, genre, and still-life painter. He was born in Franklin, Ind., Nov. 1, 1849. After studying under B. F. Hays, in Indianapolis, and in the schools of the National Academy of Design, he painted with Piloty and Wagner at Munich (1872), acquiring a thoroughly German method. On his return to New York (1878) he began to change his style of painting, gradually clarifying his color and showing an appreciation for the work of the French school. One of the most facile and brilliant technicians of the American school, Chase succeeds equally well with figure, portrait, and still life. Examples of his still life—particularly his fish, which are especially celebrated—are in the Pennsylvania Academy of Fine Arts, Metropolitan Museum, New York, and Brooklyn Institute Museum. Other well-known works are "A Broken Jug," "Ready for a Ride" (1878, Union League Club, New York), "Alice" (Art Institute, Chicago), a "Lady in Black" (Metropolitan Museum, New York), and a number of portraits (including one of his wife) and genre subjects, which he exhibited at the World's Fair, St. Louis, 1904. His more recent works include "American Fish" (1905); "Flying Clouds" and "Portrait of an Artist" (1906); "Portrait of Mrs. J." (1910); "Studio Interior" and "The Orangery" (1911); the "Portrait of Mrs. H.," awarded the Proctor prize in 1912. He became especially successful as a teacher, received many medals, is a National Academician and a member of the American Academy of Arts and Letters, and was at one time president of the Society of American Artists.

CHASIDIM, kă-sē'dĭm (Heb., saints). A name employed at different periods of history to designate some class of especially pious persons among the Jews. 1. From passages in the Psalter, the books of Maccabees, and the Talmud, it seems evident that the term was used as a designation of those who distinguished themselves by their loyalty to the law and the ancestral customs. They do not appear to have formed a sect or society or party, but were only the congregation of the pious in distinction from the apostates. They firmly opposed all Hellenizing tendencies and clung closer and closer to the ceremonies of Judaism. The members even suffered death in preference to transgressing the rites of their religion. They carried out to the letter the Sabbath laws and incurred loss and personal danger rather than extinguish a fire

on that day; but they were no less stringent in carrying out the purely ethical features of the law and were noted for their kindness and charity. Under Mattathias, the Hasmonean, they took part in the Jewish wars for independence and were keen patriots (1 Macc. ii. 42 ff., cf. also Ps. cxix). According to 2 Macc. xiv. 6, "Those of the Jews that are called Asideans, whose captain is Judas Maccabæus, nourish war and are seditious and will not let the realm be in peace." It is probable, however, that when they perceived the ambitious designs of the Hasmonean family, they made peace with Alcimus (1 Macc. vii. 12 ff.). Some scholars have maintained that they afterward formed the Essene party (see ESSENES); others that they developed into the Pharisaic party. Neither theory can be proved. The term is used as an honorary title of many distinguished rabbis. Consult Hamburger, *Realencyklopadie fur Bibel und Talmud*, vol. ii (Leipzig, 1896); Moritz Friedländer, *Geschichte der judischen Apologetik*, pp. 43 (1903); Schürer, *Geschichte des judischen Volkes*, vol. ii, pp. 472 f. (4th ed., 1907); Schloessinger, in *The Jewish Encyclopædia*, art. "Hasidæans" (1904); Oesterley, in Charles, *The Apocrypha and Pseudepigrapha of the Old Testament*, vol. i, p. 73 (1913).

2. In modern times the name "Chasidim" is applied to a sect which originated in Poland under the leadership of Israel of Miedziboz (died 1759), and after his death of Beer of Mizricz (died 1772). Israel was called "Baal Shem," 'master of the name,' because he professed to perform miracles by using the name of God, and the sect that followed him was characterized by a belief in miracles and in the approach of the coming of the Messiah. They opposed Talmudic learning. Their worship became characterized by its noisiness and the almost frenzied gyrations of its devotees, but also by the intensity of their pious sentiment. Their leader Beer was dignified with the title "Zaddik" ('righteous'). The members of the sect formed a kind of fraternity, and it spread rapidly, numbering about 50,000 in 1770. The new division provoked great opposition on the part of the Talmudists, and in 1781, in Vilna, the Chasidim were declared to be heretics, but the sect continued to flourish, and to-day has a large number of adherents. With their mystical tendencies and their simple fervent faith the Chasidim came into conflict on the one hand with the orthodox party and on the other with the rationalists, and only in recent years have they been made the object of an impartial scientific investigation. Consult Schechter, *Studies in Judaism* (New York, 1896), and especially the instructive and discriminating article by Dubnow in *The Jewish Encyclopædia* (1904).

CHASING (short form of *enchase;* Fr. *enchâsser*, from *en* + *châsse*, frame, OF. *casse*, It. *cassa*, Cat., Lat. *capsa*, case, from *capere*, to hold). The art of working in metals by indenting. This is an art of very early times and was practiced largely by the Greeks in ornamenting the draperies and costumes of religious figures for the temples. It is produced by punching from behind the general character of the design, which is afterward perfected by chiseling the details. This results in a kind of embossed engraving, often of great richness. The favorite metal used for this purpose was silver, although gold, and in very early times even iron, was thus ornamented. That the art was known at a very early period may be inferred from the shield of Achilles, the ark of Cypselus, and other productions of the kind. Such portions of the colossal statues made by Phidias and Polyclitus as were not of ivory were produced by this art. The statue of Athena by the former was richly adorned in this manner. Myron, Mys, and Mentor were also celebrated toreutic artists in antiquity, and among many moderns the most famous is Benvenuto Cellini.

CHAS'KA. A city and the county seat of Carver Co., Minn., 22 miles southwest of Minneapolis, on the Minneapolis and St. Louis and the Chicago, Milwaukee, and St. Paul railroads, and on Minnesota River (Map: Minnesota, D 6). It is the seat of an extensive brickmaking industry, and has a flour mill, sugar-beet, canning, and pickle factories, foundry and machine shops. The electric light plant is owned by the city. Pop., 1900, 2165; 1910, 2050.

CHASLES, shâl, MICHEL (1793–1880). A French mathematician. He was born at Epernon, entered the Ecole Polytechnique, of Paris, in 1812, took part in the defense of Paris in 1814, and reëntered the school in the following year. At graduation he secured the much-coveted promotion to a commission in the engineer corps, but resigned it, with rare generosity, to allow one of his fellow classmates to take the place, retiring to Chartres for the purpose of studying geometry. For a quarter of a century Chasles devoted the leisure which his wealth afforded to a profound study of this science. After a perusal of the works of Lagrange or Laplace, he read Apollonius and Archimedes and sought to clarify the obscure passages of Pappus. Chasles's classical work, *Aperçu historique sur l'origine et le développement des méthodes en géométrie* (1837, 2d ed., 1875), while modest in title, is powerful in exposition, clear in style, and rich in ingenious comparisons. In 1841 he was made professor of geodesy and mechanics at the Ecole Polytechnique, and in 1846 professor of geometry at the Sorbonne, which chair he occupied for 21 years. The appendix to the *Aperçu historique* contains the general theory of homography and reciprocity. Synthetic or projective geometry was elaborated by him, as was also the "method of characteristics" (see CHARACTERISTIC), the basis of enumerative geometry afterward extended by Schubert to n-dimensional space. Chasles contributed also some valuable propositions to the integral calculus; his discussions of the displacement of solid bodies and of static electricity have become classics in the field of science, and his solution (1845) by projective geometry of the difficult problem of the attraction of an ellipsoid on an external point is noteworthy. The words of an illustrious Englishman, "M. Chasles is the emperor of geometry," rightly suggest his title to fame.

It is not an uninteresting fact that Chasles was duped by the notorious forger, Vrain Lucas. In 1867 Chasles announced that he was in possession of 27,000 letters and documents of great value; among them were papers believed to have been written by Dante, Petrarch, Rabelais, Julius Cæsar, and Shakespeare, as well as some by Pascal, which were intended to prove that Pascal had anticipated some of the greatest discoveries of Newton. Scarcely 100 of them proving genuine, Chasles suffered not only the embarrassment of being deceived, but also the loss of his expenditure of 200,000 francs.

Bibliography. Among the chief works of Chasles are, besides the *Aperçu historique* mentioned above, the following: *Traité de géométrie supérieure* (1852; 2d ed., 1880); *Traité des sections coniques* (1868–76); *Rapport sur les progrès de la géométrie* (1871); and *Trois livres de porismes d'Euclide* (1863). His various memoirs on perspective and projective figures, duality, tortuous curves, and the principle of correspondence were published in the *Journal de l'Ecole Polytechnique* (1837–65).

CHASLES, VICTOR EUPHÉMIEN PHILARÈTE (1798–1873). A French literary critic, born at Mainvillers (Eure-et-Loir). He studied at the Lycée Imperial, was a printer's apprentice, and in 1815 went to England, where he assisted Valpy in an edition of Greek and Latin authors. In 1837 he was appointed curator of the Mazarin Library, and in 1841 professor of continental languages and literatures at the Collège de France. He wrote for periodicals, chiefly the *Journal des Débats* and the *Revue des Deux Mondes*, a large number of articles collected under the title *Esquisses*, dealing particularly with contemporary foreign literature. His other works include *Dix-huitième siècle en Angleterre* (1846); *Oliver Cromwell* (1847); *Galileo Galilei* (1862); *Etudes contemporaines* (1866); and *L'Arétin, sa vie et ses écrits* (1873). Two volumes of his *Mémoires* were posthumously published (1876–77).

CHASMOGAMY, kăz-mŏg'ă-mĭ (Gk. χάσμα, *chasma*, opening + γάμος, *gamos*, marriage). Flowers which open are said to exhibit chasmogamy, as opposed to cleistogamy, in which case the flowers never open. See POLLINATION.

CHASMOPHYTES, kăz'mō-fīts. Crevice plants. See ROCK PLANT.

CHASSAIGNAC, shà'sā'nyàk', CHARLES MARIE EDOUARD (1805–79). A French physician. He was born in Nantes and in 1835 became prosector and professor at the university and physician at the central bureau of the hospitals of Paris. He originated the surgical operation known as *écrasement*, by means of which tumors, piles, polypi, and other growths may be removed without the effusion of blood. The general introduction of drainage in surgery is also due to his initiative. He wrote: *Traité de l'écrasement linéaire* (1856); *Leçons sur la trachéométrie* (1855); *Clinique chirurgicale* (1854–58); *Traité pratique de la suppuration et du drainage chirurgical* (2 vols., 1859).

CHASSÉ, shà-sā', DAVID HENDRIK, BARON (1765–1849). A Dutch soldier, born at Tiel, Gelderland. He entered the army at an early age, and when the anti-Orange party was crushed by a Prussian army, in 1787, Chassé joined the French ranks and served for a term under Pichegru. He afterward fought with distinction in the French wars of the Revolution and the Empire, and, for the frequency with which he ordered bayonet charges, was nicknamed "Général Baïonette." He was made lieutenant general for his services in the passes of the Pyrenees. After the conclusion of peace he entered the Dutch army and served with great gallantry on the field of Waterloo. During the Belgian Revolution Chassé commanded the citadel of Antwerp and bravely defended it against an overwhelming force of Belgians and French, from Nov. 29 to Dec. 23, 1832, when he was forced to surrender. He was held by the French as a prisoner of war until May 12, 1833, when he was released and retired to private life.

CHASSELOUP-LAUBAT, shàs'lōō'lô'bà', FRANÇOIS, MARQUIS DE (1754–1833). A French military engineer, born at St. Sernin (Charente-Inférieure). He defended Montmédy in 1792, conducted the engineering operations at Maestricht in 1794, and in 1796 was chief of engineers at Mainz and in the army of Italy under Bonaparte, who promoted him to brigadier general of engineers. Until 1812 he served as head of the engineer corps of the Napoleonic armies. In 1815 he declared for Louis XVIII, who made him a peer. His great work was the fortress of Alessandria in Piedmont, in which he attempted to improve the orthodox bastioned system. His more important writings have never been printed.

CHASSELOUP-LAUBAT, JUSTIN NAPOLÉON SAMUEL PROSPER, MARQUIS DE (1805–73). A French politician, son of the preceding. He entered the Chamber of Deputies in 1837 and afterward became Councilor of State. In the Legislative Assembly of 1849 he supported Louis Napoleon, who in 1851 made him Minister of Marine. After the coup d'état he was elected to the Corps Législatif. In 1859 he became Minister of Algeria and the Colonies and gave a marked impulse to French colonization. In 1869 he was President of the Council of State from July to December.

CHASSEPÔT, shàs'pô'. A kind of breech-loading rifle. The chassepôt derived its name from its inventor, Antoine Alphonse Chassepôt, and was used by the French during the Franco-Prussian War of 1870, but it has since been superseded by the modern Lebel magazine rifle. It was, however, a great improvement on the rifles or guns previously in use, and marked the real commencement of the epoch of needle, breech, and magazine loading firearms generally. The chassepôt had four grooves and could be fired 12 times a minute. Its range was 1200 yards, and its cartridge had a calibre of .433 inch. See SMALL ARMS.

CHASSÉRIAU, shà'sā'rē'ô', THÉODORE (1819–56). A French painter and etcher. He was born on the island of Samaná, near San Domingo. At the age of 13 he entered the atelier of Ingres, and at 16 he received a medal in the Salon. Although his early works show the influence of Ingres and his later of Delaroche, yet Chassériau also possessed undoubted originality. Among his best-known paintings are "Tepidarium at Pompeii," "Susanna," and "Venus Anadyomene," all in the Louvre. Of his mural paintings the "Descent from the Cross" in St. Philippe du Roule, Paris, is the only one in a good state of preservation. His greatest achievement was the decoration of the Palais d'Orsay, which was destroyed by the Communists; a few figures which were rescued have found place in the Louvre. The best of his fine etchings are a series of 15 plates illustrating "Othello."

CHASSEURS, shà'sĕr' (Fr., from *chasser*, to hunt, chase). A branch of the military forces of France. Before the era of railroads, long-range and rapid-fire artillery and rifles, light cavalry and light infantry were much used, and were very necessary, for service in advance or on the flanks of the army. They were designed and equipped for greater mobility than was possible for the army as a whole and were very generally adopted throughout Europe at large, under various titles. The English Rifles and Light Infantry, Prussian and Austrian Jäger, and later the Italian Bersaglieri, were all of this

type, and while they still retain their former titles, the characteristics that once distinguished them have, in the evolution of the science of warfare, of necessity become general.

Every modern soldier must be a good shot, a marksman or sharpshooter if possible, and in every branch and detail mobility itself. The chasseurs, who derive their name (Fr., hunter) from the same source as the Russian Jäger, are divided into two branches: the mounted chasseurs (*chasseurs-à-cheval*), or light cavalry, and the dismounted chasseurs (*chasseurs-à-pied*), or light infantry. After the reorganization of the French army in 1873 there were 20 regiments of *chasseurs-à-cheval*, besides 4 regiments of *chasseurs d'Afrique* (regiments raised and equipped for special service in Africa), and 30 battalions of *chasseurs-à-pied*. In 1913 there were 23 regiments of chasseurs in the cavalry and 31 battalions of *chasseurs-à-pied*, as well as 4 regiments of *chasseurs d'Afrique*.

CHASTELARD, shȧ'tlär', PIERRE DE BOSCOSEL (1540–63). A French poet at the court of Francis II and his young wife, Mary, whom he afterward accompanied as page of Damville (1561) to Scotland, where his indiscreet love invited, and at last almost compelled, his execution. He it was who carried to Mary the famous *Regrets* of his poetic master Ronsard. Chastelard and the Queen exchanged also amorous verses of their own composition. His last words are said to have been a profession of undying love. Consult Swinburne, *Chastelard: A Tragedy* (London and New York, 1865; 1906). The story of Chastelard is recounted in an imaginative way by Maurice Hewlitt in his historical novel, *The Queen's Quhair* (New York, 1904).

CHASTELER, shȧ'tlȧ', JEAN GABRIEL JOSEPH ALBERT, MARQUIS DE (1763–1825). An Austrian general. He was born in Belgium, received his military education in Vienna, and entered the Austrian service. He took a prominent part in the campaigns against the Turks in 1789 and those against France during the Revolution and especially distinguished himself at Wattignies in 1793. He fought in the Tirol against Napoleon, but was beaten by Lefebvre, at Wörgl in 1809, and was compelled to fly to Hungary. When the Lombardo-Venetian Kingdom was established, he was made Governor of Venice.

CHASTELLAIN, shȧ'tlăn', GEORGES (c.1415–75). A French chronicler and poet, born in Flanders. He became attached to the courts of Philip the Good, Duke of Burgundy, and Charles the Bold as chronicler. His *Chronique des choses de ce temps* is more valuable than most such writings, for its veracity and character drawing. He wrote a *Temple de Bocace* for Margaret of Anjou, but probably had no part in the *Book of Deeds* of Jacques de Lalain. Consult De Lettenhove's edition of the works (8 vols., Brussels, 1863–66).

CHASTELLUX, shȧ'tlụks', FRANÇOIS JEAN, MARQUIS DE (1734–88). A French soldier and writer. He was born in Paris, entered the French army in 1749, distinguished himself in the Seven Years' War, and from 1780 to 1782 served as a major general in the French army, under Rochambeau, in the American Revolutionary War. After his return to France until his death he held the position of inspector of infantry, and in 1786 he became a marquis by the death of an elder brother. His reputation rests chiefly upon his *Voyages dans l'Amérique septentrionale, dans les années 1780, 1781, et 1782* (1786; Eng. trans. by Kent, or more probably George Greive, 2 vols., 1787; reprinted, New York, 1828), in which he gives an interesting account of many persons and places connected with the American Revolution and of many localities visited by him in a tour through the Middle States and the northern part of Virginia. For the most part the book has been considered a reasonably accurate picture of the United States at that time, but certain portions of it met with severe criticism, especially at the hands of Brissot de Warville, who wrote an *Examen critique des "Voyages dans l'Amérique septentrionale" dans lequel on réfute principalement ses opinions sur les Quakers, sur les nègres, sur le peuple et sur l'homme* (London, 1786). Chastellux also wrote: *De la félicité publique, ou considérations sur le sort des hommes dans les différentes époques de l'histoire* (1772; Eng. trans., 1774), which was highly praised by Voltaire (who is said to have ranked it above Montesquieu's *Esprit des lois*), which gave considerable offense to many by its strictures upon Christianity, and which won him a place in the Academy; *De l'union de la poésie et de la musique* (1775); and *Discours sur les avantages et les désavantages qui résultent pour l'Europe de la découverte de l'Amerique* (1787), in which, answering the famous question proposed by Raynal, he asserts that the advantages have greatly outweighed the disadvantages. Consult Chastellux, *Notice sur le marquis de Chastellux* (Paris, 1822), and Pascallet, *Notice historique sur la maison de Chastellux* (Paris, 1844).

CHASTE MAID IN CHEAPSIDE, A. A comedy by Thomas Middleton, printed in quarto (1630) and acted about 1612 at the Swan Theatre, London.

CHASTE TREE. See VITEX.

CHASUBLE, chăz'ụ-b'l. See COSTUME, ECCLESIASTICAL.

CHAT (from *chat*, so called on account of its note). Originally one of the Old World ground-keeping warblers or small thrushes of the large subfamily Saxicolinæ, elsewhere described under WHEATEAR, WHINCHAT, ETC. In America, one of a group of large warblers (Icteriinæ), of which the best known is the yellow-breasted chat (*Icteria virens*), a bird some 7 or 8 inches long, common in the eastern United States, at least southward. The tail is considerably longer than the wing. The color is olive green above, bright yellow beneath, fading into white posteriorly. The song is a most extraordinary jumble of whistles, chucks, and caws, and is chiefly uttered when the male is in the air, carrying on aërial evolutions little less remarkable than his song. The chats are insectivorous and are inhabitants of thickets and copses, where they can conceal themselves readily when too closely approached. The nest is built of coarse grass, leaves, and strips of bark, in a bush near the ground, and the eggs, five in number, are white evenly spotted with brown. Consult Chapman, *The Warblers of North America* (New York, 1907).

CHÂTEAU, shȧ'tō', **CHÂTEL,** shȧ'tĕl', or **CASTEL,** kȧ'stĕl' (Fr., castle, from Lat. *castellum*, dim. of *castrum*, camp). Names applied in France and other parts of the Continent to the residences of the feudal lords of the soil. The name *château-fort* is now applied to the fortified castles erected before the fifteenth century. The term "château" is also applied to the

modern French country house, when the proprietor is also the owner of extensive adjoining landed property. Royal residences, like the Louvre, were also called châteaux, although they were in reality palaces (*palais*). The valley of the Loire contains an unusually large number of châteaux, both royal, as Amboise, Blois, and Chambord, and private, as Chenonceaux, Longeais, Châteaudun, Chaumont, and Azai-le-Rideau. The word is also a component part of many names of places in France. See the bibliography of CASTILE; consult also Petit, *Les châteaux de la Loire* (Paris, 1861).

CHATEAUBRIAND, shà'tô'brê-äN', FRANÇOIS AUGUST RENÉ, VICOMTE DE (1768–1848). A French author and statesman. He was born in St. Malo, the most Catholic of French provinces, and the warm piety of his mother and the distant reserve of his father combined with the strange Breton legends and the mysterious vastness of the neighboring ocean to nurse in the child religious sentiment and poetic mysticism. To these elements direction and intensity were given by his education at Dôle and Rennes. At 20 he entered the army, thinking to try his fortune in India, but the Revolution diverted him from this, and in 1790 he obtained a government commission to seek the Northwest Passage, a quest that took him, according to his own possibly inaccurate account, on wide journeys on the Great Lakes and prairies of America and even to semitropical Florida and brought him much association with Rousseau-like Indian "children of nature" and self-communion in primeval forests. These influences first revealed Chateaubriand to himself and were revealed in all his future work, but most brilliantly in *Les Natchez*, planned about this time, though unpublished for 30 years, and in the stories that originally were connected with it—the epoch-making *Atala* (1801) and *René* (1802). The excesses of the Revolution modified Chateaubriand's zeal for political reform, and on his return to Europe (1792) after a hasty and unhappy marriage, of his parents' making, he cast in his lot with the army of the *émigrés*. He was wounded at the siege of Thionville (September, 1792), and suffering and in want he went in 1793 to England, where he supported himself for several years by literary work, and wrote the pessimistic and skeptical *Essai sur les révolutions* (1797). Here, too, he elaborated *Atala*, *René*, and *Les Natchez*, inspired partly by Rousseau's *Emile*, partly by St. Pierre's *Paul et Virginie*. These show a marked change in Chateaubriand's religious attitude, which had been free and unorthodox. This change was attributed by him to the grief caused his mother by his free thought and to his mother's death in 1798.

That France was ready for a Christian and idealistic reaction the Concordat (July 15, 1801) was about to prove. Returning to France in 1800, he struck a note that set all hearts vibrating. *Atala* was immediately and universally popular. It roused a dormant spirit of romantic idealism and, in the mental state that it disclosed, anticipated much in Lamartine and Hugo. The eloquent descriptions of nature showed rare powers of minute observation. Chateaubriand immediately took the leading place in French letters and retained it unquestioned till the appearance of Lamartine's *Méditations* (1820). *Le génie du Christianisme* (1802), a brilliant piece of special pleading, suggests that æsthetic rather than moral interests drew Chateaubriand to the Church. At bottom he was still a pessimist and a skeptic, though perhaps as sincere as he could be, for neither rational nor logical consistency was a dominant characteristic in him. The author of the *Génie*, and its readers also, were less interested to find that Christianity was true than that it was sentimentally poetic, pathetic, and æsthetic.

Chateaubriand, whose apotheosis of Christianity fell in with Napoleon's plans at this time, received a diplomatic post in Rome (1803). He was involved in intrigues, was transferred to Switzerland, and on the execution of the Duc d'Enghien (1804) resigned and began a campaign of criticism against Napoleon, who, he said, "made the world tremble, but me—never." In 1806 he started on an extensive tour in the East, visiting Greece, Turkey, Asia Minor, Palestine, Tunis, and Spain. He embodied his impressions in *Les martyrs* (1809), a prose epic of rising Christianity and sinking paganism; in *Les aventures du dernier des Abencérages* (1826), a Moorish story, and in *Itinéraire de Paris à Jérusalem* (1811), all showing "opulence of imagination and poverty of heart." The fall of Napoleon evoked *De Buonaparte et des Bourbons* (1814), which, according to Louis XVIII, was worth 100,000 men to the Legitimist cause. The work brought its author several diplomatic appointments, which he resigned in order to be free to oppose ministries that displeased him, until towards 1830 he seemed tending to liberalism. The Orléanist triumph brought him back promptly to the lost cause. Chateaubriand now sank into a discouraged silence. He translated *Paradise Lost* (1836), wrote a *Vie de Rancé*, the ascetic (1844), and revised and completed his *Mémoires d'outre-tombe*, published a little prematurely, just before his death (1848), and translated into English (1902). This is a work of some historic interest, great eloquence, remarkable prejudices, and unique self-conceit—"*René* with documentary evidence," as it has been wittily called. For Chateaubriand is his own René and in *René* lies his literary significance.

René and *Atala* mark the beginning of the Romantic school. They are to France what Goethe's *Werther* is to Germany and "Childe Harold" to England, the germ of the so-called *maladie du siècle*, a dilettant, morbid, introspective pessimism that was to infect Senancour, Lamartine, Vigny, Musset, and the youthful work of Sainte-Beuve, Dumas, and George Sand. It can be traced also, masked by stronger powers, in Hugo and in Byron. This moral influence, the helpfulness of which has been questioned, was accompanied by very great services to art. Chateaubriand was the first in France to draw attention to the literary resources of the Middle Ages and Christian antiquity. He was a renovator in imagination, criticism, history, and the founder of the new descriptive school of idealization and personification of nature, and thus as much the father of Loti as of Thierry and Michelet. He made literature national in aspiration, Christian in spirit; he persuaded his generation to break with the imitation of imitation that had sapped the literary life of the eighteenth century. His style left its mark on poetry, history, fiction—on the very language. His effect on morals and religion has been considered morbid and transitory. In literary art he marks an era.

Bibliography. Chateaubriand's works were edited in 20 vols. by Sainte-Beuve, with an intro-

ductory study of his own (1859–60). Consult also: Sainte-Beuve, *Chateaubriand et son groupe littéraire* (Paris, 1860), and other essays in *Portraits contemporains*, and *Causerie de lundis, Nouveaux lundis, Premiers lundis;* Vinet, *Madame de Staël et Chateaubriand* (Paris, 1857); Villemain, *Chateaubriand, sa vie, ses écrits et son influence* (Paris, 1859); France, *Lucile de Chateaubriand* (Paris, 1879); Bardoux, *Chateaubriand* (Paris, 1893); Lescure, *Chateaubriand* (Paris, 1892); Pailhès, *Chateaubriand, sa femme et ses amis* (Bordeaux, 1896); Maurel, *Essai sur Chateaubriand* (Paris, 1899); Bertrin, *La sincérité réligieuse de Chateaubriand* (1901); *Mémoires d'outre-tombe*, trans. by Teixeira de Mattos (6 vols., New York and London, 1902). For the reality and fiction in Chateaubriand's American and other journeys, see J. Bédier, *Etudes critiques* (Paris, 1903); V. Giraud, *Chateaubriand: Etudes litt.* (Paris, 1904); Stathers, *Chateaubriand et l'Amérique* (Grenoble, 1905); E. Champion, *L'itinéraire de Paris à Jérusalem par Julien, domestique de Chateaubriand* (Paris, 1904). Other notable books are: Gribble, *Chateaubriand and his Court of Women* (New York, 1909); Lemaître, *Chateaubriand* (1912); *Correspondance général de Chateaubriand*, ed., with introduction, etc., by L. Thomas (3 vols., Paris, 1912–13).

CHÂTEAUDUN, shă'tō'dēn' (Fr. *château*, castle + Gall. *dun*, OIr. *dún*, stronghold). The capital of an arrondissement in the Department of Eure-et-Loir, France, situated on the Loir, about 28 miles northwest of Orléans (Map: France, N., C 4). The town contains an old castle, with an enormous tower, a number of houses dating from the fourteenth, fifteenth, and sixteenth centuries, a college, and a library. The manufactures are of machinery and blankets; trade also flourishes in cattle, grain, wool, and hemp. Pop. (commune), 1901, 7146; 1911, 7296. During the Middle Ages Châteaudun was the residence of the counts of Dunois; it was burned by the Germans in 1870. Consult *Un coin de l'ancien Dunois* (Châteaudun, 1869).

CHÂTEAUGAY, shăt'ō-gā', BATTLE OF. An engagement on Oct. 26, 1813, at the junction of the Châteaugay and Outarde rivers in New York State, between 1000 English, strongly intrenched, and about 4000 Americans, the latter being defeated, owing to the incapacity of their leader, General Hampton, who brought less than half of his troops into action. The loss of the Americans was 38; that of the British, 25.

CHÂTEAUNEUF DE RANDON, shă'tō'nĕf' de rän'dôn' (Fr., castle of Randon, the hill on which it is situated). A village of France, in the Department of Lozère, 12 miles northeast of Mende, celebrated in connection with an incident of the Hundred Years' War. In 1830 the fortress, then held by French brigands, was besieged by the troops of Charles V, under the command of the gallant Du Guesclin. The garrison finally had to yield. Du Guesclin was on his deathbed when the keys of the fortress were brought, and he received them "in the name of his sovereign liege the King of France." According to another version he was already dead when the keys were brought, so that the chronicler wrote, "He never besieged a place which did not surrender to him, either alive or dead." A monument commemorating the death of Du Guesclin was erected in 1820. Consult Lavisse, *Histoire de France*, vol. iv (Paris, 1902).

CHÂTEAU-RENAULT, shă'tō're-nō', or **CHÂTEAU-REGNAUD**, -re-nyō', FRANÇOIS LOUIS ROUSSELET, MARQUIS DE (1637–1716). A French admiral. In 1673, in command of five ships, he dispersed a fleet of eight vessels under Admiral de Ruyter in the North Sea, and in 1677 with six vessels he defeated a Dutch fleet of 25 under Admiral Evertzen off the coast of Spain. He was commander in chief of the fleet sent to Ireland by Louis XIV to support the cause of James II. He became vice admiral in 1701 and marshal of France in 1703. In 1702 when guarding Spanish treasure ships in Vigo he was attacked and defeated by a fleet commanded by Sir George Rooke.

CHÂTEAUROUX, shă'tō'rōō' (named in honor of Prince Raoul of Déols, who founded it in the tenth century). A town of France, capital of the Department of Indre, situated on the left bank of the river Indre, 166 miles south of Paris by railway (Map: France, N., G 6). The town, which was formerly dirty and ill built, has been greatly improved. Across the Indre lie its beautiful suburbs, Christophe and Déols. Its gloomy castle on a hill above the river was the prison of Cardinal Richelieu's niece, the Princesse de Condé, during 23 years. The Château Raoul, built in the fourteenth century, still stands. The church of St. André (modern), the hôtel de ville with its Flemish paintings and souvenirs of Napoleon I, the statue of Gen. Henri Bertrand, a native, are other points of interest. The town has extensive factories of woolen and cotton goods, hosiery, yarn, hats, paper, parchment, hardware, tobacco, and leather. Pop. (commune), 1901, 24,957; 1911, 26,095. Consult Falconneaux Dufresne, *Histoire de Déols et de Chateauroux* (Chateauroux, 1873).

CHÂTEAUROUX, MARIE ANNE, DUCHESSE DE (1717–44). A daughter of Marquis de Nesle and favorite of Louis XV. She was born in Paris, and after the death (1740) of her husband, Marquis de la Tournelle, succeeded her three sisters as the mistress of Louis XV of France, who made her the Duchess of Châteauroux (1743). During the war of 1744 she accompanied the King as far as Metz, where he was taken ill and was prevailed upon by the Bishop of Soissons to dismiss her. Upon his return to Paris, however, she consented to a reconciliation on condition that her principal enemies at court should be banished. She died soon afterward. Consult E. and J. de Goncourt, *La duchesse de Châteauroux et ses sœurs* (Paris, 1879).

CHÂTEAU-THIERRY, shă'tō'tyâr'rē' (named in honor of Theuderich or Thierry IV, for whom it was founded by Charles Martel in the eighth century). The capital of an arrondissement in the Department of Aisne, France, situated on the right bank of the Marne, 59 miles northeast of Paris. Towering above it on the heights are the ruins of the castle from which the town takes its name. Its chief buildings are a commercial college, a public library, and an old cathedral (Map: France, N., J 3). Pop. (commune), 1901, 7083; 1911, 7771. The Champagne district begins here, and, besides its wine trade, it is famous for the manufacture of musical and scientific instruments and woolen yarn; stone is quarried near by. The position of Château-Thierry has subjected it to many disasters. It was captured by the English in 1421, by Charles V in 1545, by the Spanish in

1591; was pillaged in the Fronde wars in 1652 and suffered severely in the Napoleonic campaign of 1814. Château-Thierry was the birthplace of La Fontaine. Consult Poquet, *Histoire de Château-Thierry* (2 vols., Château-Thierry, 1839–40).

CHÂTEAUX EN ESPAGNE, ün nâ'spâ'ny' (Fr., castles in Spain). Romance castles; castles in the air; daydreams.

CHATEL. See CHÂTEAU.

CHÂTELAIN, shâ'tlăn'. See CASTELLAN.

CHÂTELAIN DE COUCY ET DE LA DAME DE FAYEL, sha'tlăn' de kōō'sē' â de lâ dăm de fâ'yĕl', HISTOIRE DU (Fr., history of the Châtelain of Coucy and the Lady of Fayel). A French romance founded on the quasi-historical loves of Renaud, Châtelain de Coucy, and belonging to the thirteenth century. An edition by M. Crapelet appeared in Paris in 1829. See COUCY, THE CHÂTELAIN DE.

CHÂTELET, shâ'tlâ'. A town of Belgium in the Province of Hainaut, situated a few miles east of Charleroi on the Sambre opposite Châtelineau. It contains a number of smelting works and iron foundries. Its chief industries are coal mining and the manufacture of cutlery and ironware. It has numerous technical training schools. Pop., 1900, 10,932; 1910, 11,573.

CHÂTELET (Fr., a little castle). A fortification placed at the entrance to towns or at the mouth of rivers. The most noted châtelets were the large and small châtelets of Paris. That either one was built by Julius Cæsar is purely mythical; but it would seem that Charles the Bald spoke of them in his capitulary of 877 as a defense against the Normans. The great châtelet situated on the present Place du Châtelet was remodeled in the years 1506 and 1684, became the seat of royal justice for Paris, and continued such until the Revolution of 1789. Officials were added gradually until just previous to the Revolution the list numbered over 700. The first morgue was established under the châtelet as early as 1363. It was also a noted prison, and although Louis XVI endeavored to abolish it in 1780, it still contained many prisoners at the opening of the Revolution. In 1802 the large châtelet was demolished to open the way for the Boulevard Sébastopol. The small châtelet situated near the present Hôtel-Dieu was rebuilt in the twelfth and thirteenth centuries and used as a prison in the eighteenth century. It was demolished in 1782.

CHÂTELET-LOMONT, shâ'tlâ'lô'môn', GABRIELLE EMILIE, MARQUISE DU (1706–49). A French author, born in Paris. She was distinguished for her wit, talent, and learning, especially in mathematics and physics, but chiefly for her intimacy with Voltaire, who was for several years her guest at Cirey, her complacent husband's countryseat on the Lorraine frontier. In 1747 she exchanged Voltaire's cooling affections for those of Captain Saint-Lambert, but the philosopher remained her devoted and indulgent friend till her death in childbirth two years later. She translated Newton's *Principia,* with annotations, and wrote on the philosophy of Leibnitz, but her *Correspondance* with Voltaire is the most instructive and interesting of her productions. Consult De Graffigny, *Vie privée de Voltaire et de Mme. de C.* (1820), and Capefigue, *La marquise du Châtelet* (Paris, 1868); and see also bibliography under VOLTAIRE.

CHÂTELLERAULT, shâ'tĕl'rō' (ML. *Castrum Heraldi, Castellum Airaldi,* herald's castle). A town of France, capital of an arrondissement in the Department of Vienne, situated on the river of that name, 18 miles north-northeast of Poitiers (Map: France, S., F 6). A handsome stone bridge, with a massive castellated gateway built by Sully, connects it with Châteauneuf, a suburb on the other side of the river. Châtellerault, which is an ill-built, mean-looking town, is one of the chief seats of the manufacture of cutlery in France, and since 1820 has had a national manufactory of swords and bayonets, employing nearly 2000 workmen. There are also extensive manufactures of millstones, watches, leather, candles, and lace, which employ 4000 more. Its river port makes it the entrepôt for the produce of wine, brandy, and prunes of an extensive district. Pop. (commune), 1901, 20,801. 1911, 18,260. Consult Lalanne, *Histoire de Châtellerault* (Châtellerault, 1859).

CHATFIELD-TAYLOR, HOBART C. (1865–). An American author, born in Chicago, and educated at Cornell University. He served as editor of *America* for two years, was Consul of Spain at Chicago in 1892-94, and became a member of honorary societies in France, Spain, Italy, and Portugal. Besides his contributions to the *North American Review,* the *Bookman,* and the *Dial,* he published *With Edge Tools* (1891); *An American Peeress* (1893); *Two Women and a Fool* (1895); *The Idle Born* (1900); *The Crimson Wing* (1902); *Molière: A Biography* (1906); *Fame's Pathway* (1909); *Goldoni: A Biography* (1913).

CHATHAM, chăt'am (AS. *Cotcham,* village of huts, from *cot,* hut + *ham,* inclosure). A parliamentary borough, river port, fortified town, and naval arsenal, in the County of Kent, England, on the estuary of the Medway, 34 miles east-southeast of London (Map: England, G 5). It lies a little to the east of Rochester, with which it is politically united, as it is also with Gillingham, on the east. The streets are generally irregular and narrow, but much has been done to improve this since the incorporation of the town in 1890. It sends one member to Parliament. Its gas and water supply is furnished by private companies, but the municipality has built a pier, established a public park and recreation grounds, constructed a fine town hall and municipal offices, and expends a considerable sum on technical education. Chatham owes its importance to its naval and military establishments, situated at New Brompton (a suburb on a height half a mile north of Chatham). The so-called lines or fortifications which inclose these works are the frequent scenes of field operations, sham fights, and reviews. From a military point of view, the lines of detached forts connected with Chatham, which have superseded for defensive purposes the old "lines," constitute a fortification of great strength, and, together with the strong forts erected on the Medway, form an excellent protection to London from invasion from the southeast. Chatham is an important military post with large infantry, artillery, and engineer barracks, a school of military engineering, and a large military hospital. As a naval base, it is one of the most important in the kingdom. The royal dockyard, which was first established by Queen

Elizabeth, embraces an area of about 500 acres and contains building slips and floating docks in which the largest ships of the navy may be built or repaired. One basin, famous for its size, has a frontage of 6000 feet and a width of 800 feet. At times 7000 workmen are employed. In connection with the yard is a metal mill which supplies it with copper plates and bolts. Melville Hospital is a large establishment for sailors and marines. There are also extensive barracks for marines. Pop., 1891, 31,700; 1901, 37,057; 1911, 42,250. Consult "Chatham," in *Municipal Journal* (London, 1900).

CHATHAM. A town in Northumberland Co., New Brunswick, on the Miramichi River, 25 miles above its entrance into Miramichi Bay, 5 miles east of Newcastle, and on the Intercolonial Railway (Map: New Brunswick, D 2). It has a Roman Catholic cathedral, hospital, and a fine city building. It is a port of entry, with a fine harbor, pulp factories, foundries, mills, and a large export trade in fish, lumber, etc. Many hunting parties set out from here. Pop., 1901, 4868; 1911, 4666.

CHATHAM. A city and the county seat of Kent Co., Ontario, Canada, on the Thames River, 45 miles east of Detroit, Mich., reached by the Grand Trunk, the Wabash, the Père Marquette, and the Canadian Pacific railroads, and by steamboats from lakes Erie and Huron and the Detroit River (Map: Ontario, B 9). It is in an agricultural district, has a large trade in grain and lumber, and manufactures lumber products, carriages, flour, boilers and engines, iron goods, woolens, etc. The United States is represented by a consul. Pop., 1901, 9068; 1911, 10,770.

CHATHAM. A borough in Morris Co., N. J., 15 miles west of Newark, on the Lackawanna Railroad, and on the Passaic River (Map: New Jersey, D 2). With a picturesque situation and good roads, it has become a residential suburb of New York and Newark. It is the centre of an extensive rose-growing industry. Chatham owns and operates its water works and electric light plant. It was incorporated as a village in 1892 and as a borough in 1897. The mayor and members of the council are elected annually. Pop., 1890, 780; 1900, 1361; 1910, 1874.

CHATHAM, Earl of. See Pitt, William.

CHATHAM ENGINEERING SCHOOL. See Military Education.

CHATHAM ISLANDS. A small group in the Pacific Ocean, 536 miles east of Lyttelton in lat. 43° 38′ to 44° 40′ S., long. 177° to 179° W. (Map: Australia, L 7). Area, 321 square miles. The group was discovered in 1791 by Lieutenant Broughton, and the name of his brig was given to both the cluster and its chief member. A salt or brackish lake, 72 miles in area, occupies the interior of Chatham Island. The soil and climate of the archipelago, in general, are good. Wheat yields abundantly, and horses, cattle, sheep, and pigs thrive well. Considerable trade is carried on in supplies for whalers and passing ships. The greater portion of the two principal islands is used for sheep grazing. The native canoe, instead of being cut out of a single tree, is merely wickerwork bound together by cordage of native flax. The aboriginal Morioris, who in 1831 were 1200, have been supplanted by a mixed population of Maoris and whites, a few only surviving. Pop., 1911, 453 (234 Europeans and 219 Maoris and Morioris). The Chatham Islands are politically attached to New Zealand.

CHATI, shà'tē'. See Wild Cat.

CHATILLON, Charles de. See Charles de Blois.

CHÂTILLON-SUR-SEINE, shà'tē'yôN' sür-sân' (Fr., castle; cf. Sp. *castillo*, castle). The capital of an arrondissement in the Department of Côte-d'Or, France, on the Seine, about 45 miles north-northwest of Dijon (Map: France, N., K 5). The town is divided into two parts by the river. Of the château which gave the town its name nothing now remains save several ruined walls. The ground on which it stood has been converted into a cemetery, but the Château Marmont, built by Marshal Marmont, who was born in Châtillon, still stands. The church of the ancient château, Sainte-Vorle, has an interesting Holy Sepulchre done in stone. There are important manufactures of woolens, cottons, hats, and leather, and ironworks. Pop. (commune), 1901, 4807; 1911, 4698. Châtillon was an important fortified town in the twelfth century and the seat of the dukes of Burgundy. It was the capital of the Pays de la Montagne, part of Burgundy. From Feb. 5 to March 19, 1814, a congress of the Allied Powers assembled at Châtillon vainly endeavored to come to terms with Napoleon. The failure of negotiations was followed by the resumption of hostilities. Here a German detachment suffered a severe repulse, on Nov. 19, 1870, at the hands of Ricciotti Garibaldi, and was driven back upon Château-Villain.

CHAT'MOSS. A bog in Lancashire, England, about 12 miles square, which reaches at some places a depth of 30 feet. It is celebrated as the scene of successful efforts for the reclaiming of bogs in the end of the eighteenth and beginning of the nineteenth century, and of one of the great engineering triumphs of George Stephenson in the construction of the Liverpool and Manchester Railway.

CHATOYANT, shà-toi'ant, *Fr. pron.* shà'twä'yäN' (Fr., from *chat*, cat). A mineral is chatoyant when it exhibits a changeable internal band of light. The phenomenon is said to be due to minute internal parallel striations or inclusions. It is especially noticeable when the mineral is cut with a convex face (*en cabochon*). See Cat's-Eye.

CHATRIAN, shà'trē-äN', Alexandre. See Erckmann-Chatrian.

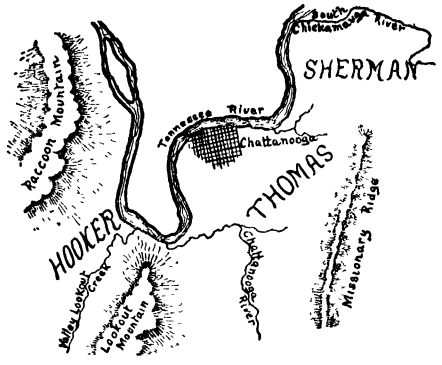
CHATSWORTH. The mansion of the dukes of Devonshire and one of the most splendid private seats in England. It is situated in Derbyshire, on the Derwent. Sir William Cavendish in 1570 began the old mansion, which was finished by his widow, afterward Countess of Shrewsbury. In this building Mary, Queen of Scots, was imprisoned for 13 years. The present edifice includes the Ionic pile, 183 by 172 feet, built 1687–1706, by the first Duke of Devonshire, after designs by Talman and Wren. The façade is 720 feet long or, with the terraces, 1200 feet. The grounds around are 9 miles in circuit and are surpassed only by those at Versailles.

CHAT'TAHOO'CHEE (Creek *chátu*, rock; *hutchas*, mark; pictured rocks). A river rising on the south slope of the Blue Ridge, in northern Georgia. It traverses the State in a southwesterly direction to its west edge, where, turning south, it becomes the boundary between Georgia and Alabama, and finally, after receiving the Flint from the east, crosses Florida under the name "Appalachicola." It empties

into the Gulf of Mexico (Map: Alabama, D 4). The Chattahoochee is over 500 miles long, is navigable to Columbus, 200 miles, and drains an area of about 17,000 square miles.

CHAT'TANOO'GA. A city and important railroad centre and the county seat of Hamilton Co., Tenn., 150 miles by rail southeast of Nashville, on the Alabama Great Southern, the Central of Georgia, the Cincinnati, New Orleans, and Texas, the Nashville, Chattanooga, and St. Louis, the Southern, the Tennessee, Alabama, and Georgia, and the Western and Atlantic railroads; and on the Tennessee River, which is navigable as far as this place eight months of the year (Map: Tennessee, F 5). To the south is Lookout Mountain, from which seven States can be seen. Chattanooga has a fine marble customhouse, the Baroness Erlanger Hospital, a Carnegie library, a museum, two opera houses, University of Chattanooga (Methodist Episcopal), the Chattanooga College of Law, Baylor School, McCallie School, and Girls' Preparatory School. The Chickamauga National Military Park, laid out by the Federal government on the site of the battle of Chickamauga, is south by east of the city. Other features of interest are Fort Oglethorpe, a brigade post, and the National Cemetery, containing 13,322 graves. A large trade is carried on in grain, iron, coal, and lumber, and there are extensive manufactures of iron and steel, machinery, cotton goods, furniture, bricks and tiles, wagons, stoves, textiles, leather goods, etc. In November, 1913, a $9,000,000 lock and dam and power plant was completed at Hale's Bar, on the Tennessee River, near this city. Chattanooga adopted the commission form of government in 1911. The annual income and expenditures balance at nearly $800,000. The main items of expense are: $94,000 for the fire department; $73,000 for police; $152,000 for schools; $10,000 for health department; $110,000 for streets and sewers; $69,000 for parks and buildings. Originally called Ross's Landing, Chattanooga was settled in 1836 and was incorporated in 1839. It became of great military importance in the Civil War, and the vicinity was the scene of several hotly contested battles, notably those of Chickamauga, Missionary Ridge, Lookout Mountain, and Chattanooga (q.v.). It was from here that Sherman began his famous march to the sea. In 1863 it was occupied by the Union forces. The city was almost destroyed during the Civil War. Chattanooga has been chosen as the southern headquarters of the Interstate Commerce Commission. Pop., 1870, 6093; 1900, 30,154; 1910, 44,604.

CHATTANOOGA, BATTLE OF. One of the most important battles of the Civil War, fought in the vicinity of Chattanooga, Tenn., Nov. 23–25, 1863, between a Federal army of 60,000, under General Grant, and a Confederate army of about 40,000, under General Bragg. After the battle of Chickamauga (q.v.) Bragg had held the Federal troops closely besieged in Chattanooga and, by seizing nearly all of their lines of supply, threatened them with starvation. In October Thomas superseded Rosecrans, who had commanded at Chickamauga, and on the 23d Grant, recently placed in command of the military operations in the West, arrived in person. Grant immediately reopened his communications with the Federal base of supplies at Nashville (October 26, 27, and 28), by advancing Hooker's troops from Bridgeport and sending a small force from Chattanooga to seize the points in Lookout valley which controlled Brown's Ferry. After awaiting reënforcements under Sherman, he took the aggressive on November 23, when Thomas, in an engagement lasting two



BATTLEFIELD OF CHATTANOOGA.

hours, drove back Bragg's advanced guards and established a new Federal line a mile in advance of the old one. On the 24th Sherman, on the left, carried a detached point of Missionary Ridge, and Hooker, on the right, in the famous "Battle above the Clouds," carried Lookout Mountain, the Confederates retreating from his front during the night. At daylight on the 25th Sherman renewed his attack on the Confederate right, but, owing to the unavoidable delay of Hooker in coming to his assistance, was placed in a precarious position, and as a diversion Grant ordered an assault by Thomas's troops, under Sheridan and Wood, against the Confederate centre. These troops quickly drove the enemy from his rifle trenches, and then, without orders from Grant or Thomas, rushed impetuously up the steep hill (Missionary Ridge) and, in one of the most remarkable charges known in military history, carried the fortifications under a terrific fire, gained possession of the crest of the ridge, and drove the Confederates, panic-stricken, from the field. The Confederate retreat now became general, and during the night Bragg, hotly pursued by Sheridan, withdrew rapidly up the Chickamauga valley. The losses in killed, wounded, and missing were for the Federals 5815; for the Confederates, 6687. The victory not only relieved Chattanooga, but also forced Longstreet, then besieging Burnside at Knoxville, to retreat into Virginia. Consult: the *Official Records*, vol. xxxi (Washington, 1890); Cist, *The Army of the Cumberland* (New York, 1897); Nicolay and Hay, *Abraham Lincoln: A History*, vol. viii (10 vols., New York, 1897); and Grant, *Personal Memoirs* (2 vols., new ed., New York, 1895).

CHATTANOOGA, UNIVERSITY OF. A coeducational college under the auspices of the Methodist Episcopal church, founded at Chattanooga, Tenn., in 1867. The university has a preparatory department at Athens, Tenn., with a college department at Chattanooga. They are under the same management, but the instructors are different. At the college department there were, in 1913, 119 students and 12 members of the faculty. In the preparatory department there were 285 students and 12 instructors. The value of the buildings and grounds of the university in 1913 was $416,750. The endowment was $375,739. About $350,000 was

recently subscribed for endowment and buildings to be paid in installments. This increased endowment was made possible by a subscription of $150,000 by the general education board on condition that $350,000 additional be raised in Nov. 1, 1912. The library of the college department contains about 8000 volumes and the preparatory department about 3000. The president is John H. Race, D.D.

CHAT'TEL (OF. *chatel, catel,* ML. *captate, capitale,* property, from Lat. *caput,* head). A term nearly, though not quite, coextensive with the term "personal property" (q.v.), i.e., property which passes to the executor or administrator, as distinguished from real property, which is inheritable and passes to the heir. By chattel is meant that species of personal property which is capable of physical delivery and possession. Thus, *choses* (things) in possession are chattels, but *choses* in action (i.e., legal claims for moneys due), although personal property, are not chattels in the technical sense.

Chattels are classified as *chattels real* and *chattels personal.* A *chattel real* is any interest or property in land less than a freehold. As opposed to freeholds, *chattels real* are regarded as personal property; but, as being interests in real property, they are called *chattels real,* to distinguish them from other chattels, which are called *chattels personal.*

Certain objects which are a part of the real estate may become chattels upon being severed from the real estate—as, e.g., timber which has been cut, or ore which has been mined and removed from the land; and certain other objects which are still attached to and form a part of real property—as, e.g., growing annual crops or emblements (q.v.)—are for some purposes regarded as chattels. On the other hand, in general, chattels which become attached to the land or are used as a part of the real estate lose their character as chattels and become real estate. Thus, the materials used in constructing a house or other structure forming a part of the real estate are real estate. Certain chattels, however, affixed to the real estate, but capable of removal—as, e.g., machinery, articles of furniture, etc.—retain their character as chattels for some purposes, while for others they are deemed to be real estate. Chattels of the Church are known as fixtures.

At common law, titles to *chattels personal* in existence are transferable by mere agreement, except in case of gift, when delivery of the chattel is required in order to confer a title upon the grantee. The various branches of the law of chattels are specifically treated under the several titles relating to them, such as GIFT, SALE, PERSONAL PROPERTY, FIXTURES, and the authorities mentioned under those titles may be consulted for a fuller statement of the law. For the early law as to ownership of chattels in England, consult Pollock and Maitland, *History of English Law* (Boston, 1899).

CHATTEL MORTGAGE. The transfer of personal property as security for a debt or obligation in such manner as to pass title to the transferee or mortgagee which may be revested in the transferor or mortgagor upon payment of the debt or performance of the obligation; but upon his failure to pay or perform, the title becomes absolute in the mortgagee. Courts of equity, however, will allow the mortgagor to redeem the mortgaged chattel after the debt or obligation becomes due. (See MORTGAGE; PLEDGE.) The mortgagor of chattels is generally held to have title even in jurisdictions where the mortgagee of real estate is deemed to acquire only an equitable lien, as distinguished from a legal title. At common law, a chattel mortgage might be made without writing or other formality, provided the chattel was delivered to the mortgagee; but under modern statutes, particularly those relating to registration (q.v.) of mortgages, a chattel mortgage is required to be in writing and recorded in order to give it validity against third parties, and in some jurisdictions, by statute, chattel mortgages become void unless refiled or otherwise renewed, as by statute required, from year to year. Consult Cobbey, *A Practical Treatise on the Law of Chattel Mortgage* (St. Paul, 1893).

CHATTERER. A term formerly applied to the waxwings and some related birds with little applicability. It is now, with more or less propriety, restricted by ornithologists to the South American passerine family Cotingidæ, which may be better called cotingas. See BELL BIRD; COTINGA; WAXWING.

CHAT'TERTON, EDWARD KERLE (1878–). An English author and journalist, born at Sheffield. After graduating from Oxford University he entered journalism in London, writing especially art and dramatic criticisms. He was at various times subeditor of the *Art-Record,* subeditor of the *Daily Mail,* editor of the *Lady's Realm,* and that journal's dramatic critic. His publications include: *T. Sidney Cooper: His Life and Art* (1903); *The Marriages of Mayfair* (1909); *Modern Journalism* (1909); *Down Channel in the Vivette* (1909); *The Boy's Book* (1910); *The Story of the British Navy* (1911); *Royal Love Letters* (1911); *Through Holland in the Vivette* (1912); *King's Cutters and Smugglers* (1912); *Ships and Ways of Other Days* (1913).

CHAT'TERTON, THOMAS (1752–70). An English poet, born in Bristol, Nov. 20, 1752. His father, who had once been a sexton of St. Mary Redcliffe, Bristol, and also master of a charity school, died about two months before the poet's birth. Chatterton was educated at the school of which his father had been master and was thought a dull child; but, making acquaintance with a black-letter Bible which his mother often used, the dormant spirit flashed up. From this book he learned to read. From early years he was fond of all kinds of antiquities; he clung around old walls like the ivy and haunted twilight ruins like the bat. At the age of 14 he was apprenticed to John Lambert, an attorney. His situation here was uncomfortable; he took his meals in the kitchen with the footboy and, when refractory, was chastised with a ruler. In October, 1768, the new bridge at Bristol was opened, and Chatterton sent to a newspaper an account, in antique phraseology and spelling, of the ceremonies attending the opening of the old one in 1248, the whole purporting to be taken from an ancient manuscript. In the preceding year he presented himself to a certain Bristol pewterer, Burgum by name, and astonished the craftsman by the sight of a parchment in which his pedigree was traced back to the Norman Conquest. He also exhibited to his friends copies of old poems, which, he said, were composed by one Thomas

Rowley, a mythical monk of the fifteenth century. These manuscripts made some stir in his native city, but not enough to satisfy Chatterton. Accordingly Horace Walpole, at that time collecting additional materials for his *Anecdotes of Painting in England*, received from Chatterton several pages of antique writing, accompanied by a short note (1769). The pretended manuscript gave biographical sketches of celebrated painters who had flourished in England several centuries before, and of whose existence Walpole had never dreamed. Walpole, put off his guard, answered his unknown correspondent at once, expressed his delight at receiving the manuscript, and desired, as a personal favor, that all the other antique writings, poems included, mentioned in the note should be forwarded. Chatterton immediately sent accounts of a great many more painters and poets and also gave some slight sketch of his personal history. On receipt of this second communication Walpole suspected a trick. The poems he showed to Mason and Gray, who at once pronounced them forgeries. He then wrote Chatterton, administering a great deal of excellent advice. Chatterton replied, desiring that the manuscript should be returned at once; but by the time the letter reached London Walpole was about to start for Paris, and it was allowed to remain unanswered. It was returned three months later. From his earliest youth Chatterton had a ghastly familiarity with the idea of suicide. Among his papers preserved in the British Museum is a last will and testament, "executed in the presence of Omniscience, the 14th of April, 1770," full of the wildest wit and profanity. This, and similar documents falling into the hands of his friends, led to his dismissal from Lambert's office. Released from the slavery of law, Chatterton left for London, April 24, 1770, taking with him the Rowley manuscripts. He found shelter in the house of one Walmsley, a plasterer, in Shoreditch. No sooner had he settled there than he began to work as with a hundred hands. During the last few months of his life he poured forth squibs, satiric poems, political essays, burlettas, letters in the style of Junius, and meditated writing a history of England, to appear in parts. For a time his prospects seemed very bright. He obtained an introduction to Lord Mayor Beckford; he sent glowing letters home, accompanied by presents to his mother and sisters. Ultimately he left the plasterer's in Shoreditch and took lodgings in Brooke Street, adjoining Holborn. Unhappily for him, editors of opposition papers were willing enough to insert and praise his articles, but were disinclined to render an equivalent in cash. The means of life were now fast failing. On Aug. 25, 1770, his landlady, alarmed that her lodger did not make his appearance, had the door of his room broken open; saw the floor littered with small pieces of paper, and Chatterton "lying on the bed with his legs hanging over, quite dead." He had taken arsenic, in anticipation of a slower death from starvation.

Chatterton, dying before he was 18 years old, was certainly a "marvelous boy." While a peculiar interest is attached to all that he wrote, he is best remembered as the author of the so-called "Rowley Poems." Of them only one—"Elinour and Juga"—appeared during his life. The rest were collected and published by T. Tyrwhitt in 1777. Some of them possess that rare beauty of imagination which we associate with Coleridge and Keats. Indeed, these latter poets owed much to Chatterton. So, too, did Dante Rossetti and William Morris. We may cite especially "The Ballade of Charity," the first and third "Eclogues," the "Tragedy of Ælla," the "Tragedy of Godwin," "The Tournament," and the "Parliament of Sprites." Perhaps the best edition of Chatterton is *The Poetical Works of Chatterton* (1871, introductory essay by W. W. Skeat in vol. ii) in the "Aldine Edition of the British Poets." It also contains a memoir of the poet by Edward Bell. Consult: Masson, *Chatterton: A Biography* (New York, 1899); Watts-Dunton's essay in Ward, *English Poets*, iii (London and New York, 1880); Beers, *English Romanticism* (New York, 1898); Russell, *Thomas Chatterton, the Marvelous Boy* (New York, 1909); and Ingram, *The True Chatterton* (London, 1910).

CHATTI. See CATTI.

CHAUCER, chą'sẽr, GEOFFREY (c.1340–1400). The first great English poet. The son of John Chaucer, a London vintner, he was born in London about 1340, or possibly a few years earlier. Of the poet's life few trustworthy details have come down to us. The usual biography is a fabrication. But certain facts are contained in the official documents of the time, and, besides this, Chaucer sometimes speaks of himself. In 1357 he was in the service of the Countess of Ulster, wife of Lionel, the son of Edward III. His position was most likely that of a page. He was in the army of his King, who invaded France in 1359–60. He was taken prisoner, but was ransomed on March 1 of the latter year. Chaucer is not mentioned again until 1367, when he received from the King a pension of 20 marks under the title of "valet." From this time on Chaucer may be followed more closely, his name occurring frequently in public documents. From valet he rose to the rank of squire in the King's household. Chaucer was soon sent on several important foreign missions to Flanders, France, and Italy. His first Italian journey was in 1372–73, when he went to Genoa and Florence, and, as many believe, to Padua, where he learned from Petrarch the story of the Patient Griselda, the tale told by the Clerk of Oxford, one of the Canterbury pilgrims. In 1378 he again went to Italy, returning early the next year. In 1374 he was appointed comptroller of the customs for wool, skins, etc., at the port of London, and in 1382 comptroller of petty customs—of wine, candles, and other small articles. Both these positions he lost in 1386, but in that year he was elected to Parliament from Kent. Three years later he was appointed clerk of the King's works at Westminster, the Tower of London, and various royal manors, and in 1390 clerk of the works for St. George's Chapel, Windsor. During 1391 he lost these positions, probably because the repairs were completed. At about this time he became forester of North Petherton Park, Somersetshire. This appointment he held until his death. After 1386 Chaucer was at various times in financial trouble. It is not to be supposed that he was inefficient as an executive officer; he was rather a sufferer from the ups and downs of politics. During the reign of Richard II (1377–99) there were two parties, one led by John of Gaunt and the other by the Duke of Gloucester. Chaucer belonged to the first and shared in its reverses. When Henry Bolingbroke gained the throne as Henry

IV (1399), Chaucer was placed in better circumstances, but he did not live to enjoy his good fortune. He died on Oct. 25, 1400, and was buried in Westminster Abbey. Chaucer was married some time before 1374, probably as early as 1366. The surname of his wife is uncertain, but her Christian name was Philippa. She seems to have died in 1387. The fifth centenary of Chaucer's death was observed on Oct. 25, 1900, when the Poet Laureate unveiled a memorial window to him in St. Saviour's Cathedral, Southwark.

Chaucer was thus a man of affairs as well as a poet. The exact date of composition cannot be fixed for his various poems. In grouping them it has been customary to assign those that show a knowledge of Italian literature to a period following the first visit to Italy. But this procedure is not quite convincing. In the prologue to the "Legende of Good Women," written about 1385, Chaucer mentions his most important poems down to that date—"Troylus and Cryseyde," "The House of Fame," "Boke of the Duchesse," the "Assembly of Foules," "Palamon and Arcite," "Life of St. Cecile" (the last two were incorporated into the *Canterbury Tales*), and many ballades, roundels, and virelays. All these poems just mentioned by name are very beautiful. Of them, "Troylus and Cryseyde," founded on the mediæval Troy legend, is by far the longest. It was a favorite with Dante Rossetti; and Chaucer is indeed most subtle here in his psychology. In much of the work cited above, Chaucer was to some extent a translator. He did not, however, follow Boccaccio and his other originals slavishly, but rather made use of them in a broad and free way. His greatest work is the *Canterbury Tales*. Here Chaucer brings together at the Tabard Inn men and women of every degree, from the knight to the cook, and plans to have each tell stories on the way to Canterbury and on the return. Of this vast scheme he lived to carry out only a part. The stories were intended to represent the literary types current in his day, such as the romance of chivalry, the legend, and the *fabliau*, or poetic fable, and they were to be in harmony with the characters sketched so delightfully in the prologue. Of this prologue Dryden wrote the famous passage: "'Tis sufficient to say, according to the proverb, that here is God's plenty. We have our forefathers and great-grandames all before us, as they were in Chaucer's day; their general characters are still remaining in mankind, and even in England, though they are called by other names than those of monks, and friars, and canons, and lady abbesses, and nuns; for mankind is ever the same, and nothing lost out of nature, though everything is altered."

Chaucer wrote several minor poems, among which are the "Complaint to Pity" and the "Complaint to his Purse." While it is agreed that Chaucer translated "The Romance of the Rose," there is disagreement as to whether the extant version is wholly his. Indeed, it has been argued, though not very successfully, that it is throughout the work of another hand. "The Court of Love," "The Flower and the Leaf," and certain other poems that have been attributed to him critics no longer accept as his. Chaucer also translated the work of Boëthius entitled *De Consolatione Philosophiæ*, a favorite book of the Middle Ages, and one of which we have a version by King Alfred. No better than his contemporaries in prose, Chaucer rises far above them all in verse. At a time when English poetry was dull and without art, he wrought as a craftsman of the very first rank. He invented the seven-line stanza and the heroic couplet employed by Dryden, Pope, and a host of other poets. He was indeed the father of English poetry.

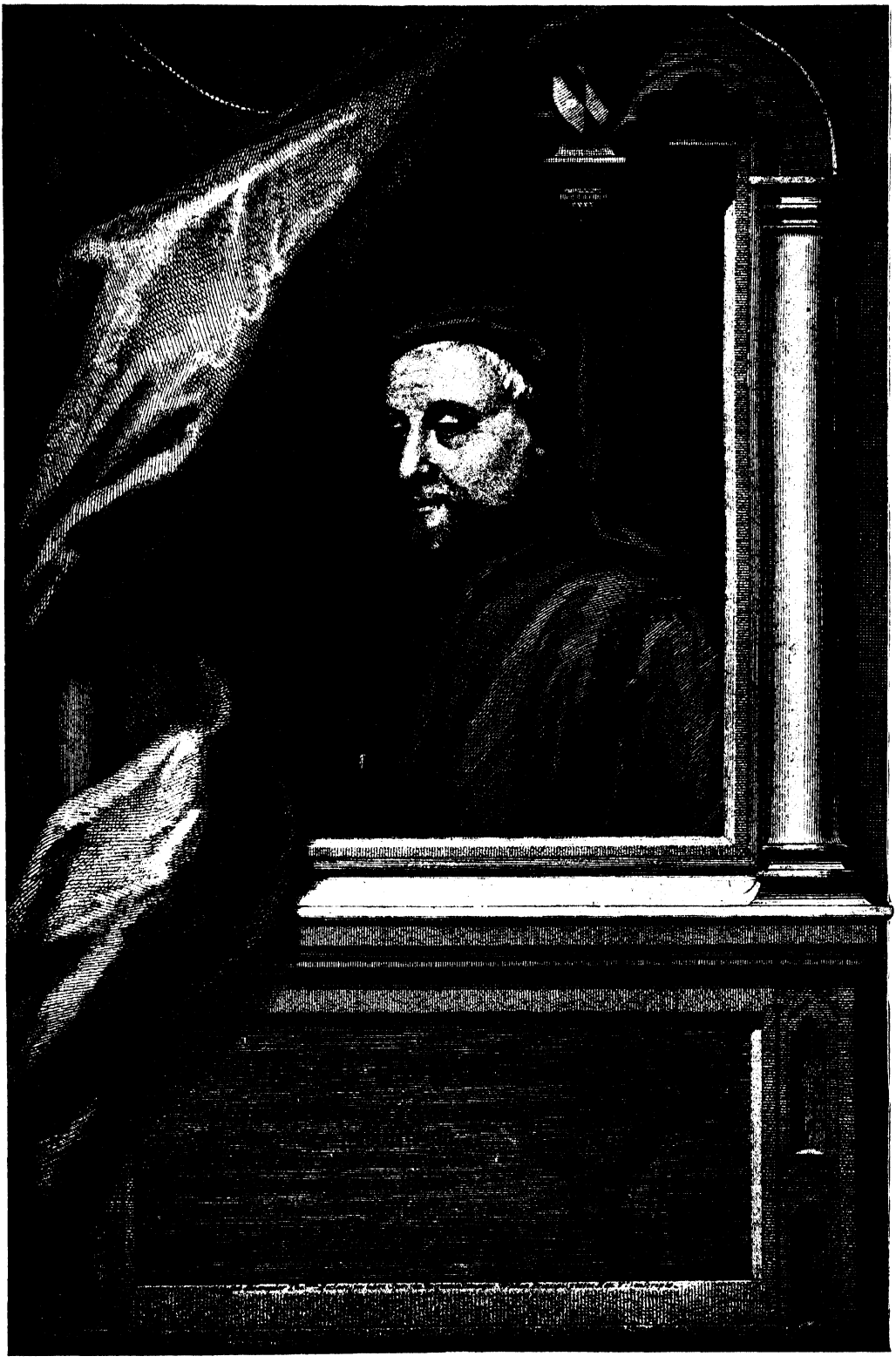
Bibliography. The first competent editor of Chaucer was Thomas Tyrwhitt, whose edition of the *Canterbury Tales* appeared in 1775, a glossary being added three years later. An admirable edition of the *Complete Works*, by Skeat, in 7 vols., was published at Oxford in 1894–97. A convenient edition in 1 vol. is the Globe (London and New York, 1898). The most exhaustive work on Chaucer is by T. R. Lounsbury: *Studies in Chaucer* (3 vols., New York, 1892). Indispensable to the Chaucer student are the publications of the Chaucer Society, founded in 1867 by F. J. Furnivall. Consult also: Ten Brink, *Chaucer: Studien zur Geschichte seiner Schriften* (Münster, 1870); *Chaucer: Sprache und Verskunst* (Leipzig, 1884); Skeat, *The Chaucer Canon* (Oxford, 1900). For a summary of all known facts and dates of Chaucer's life, see Kirk, *Life-Records of Chaucer* (London, 1900), part iv, published by the Chaucer Society. A most useful work, also, is Hammond, *Chaucer: A Bibliographical Manual* (London, 1909). MacKaye, *Complete Poetical Works of Chaucer: Now first Put into Modern English* (New York, 1912), is helpful to beginners in Chaucer; and John Koch, *A Detailed Comparison of the Eight Manuscripts of Chaucer's Canterbury Tales*, etc. (Heidelberg, 1913), a careful textual study.

CHAUCER'S DREAM. A title originally prefixed to that poem of Chaucer which is now known as *The Boke of the Duchesse*, or *The Deth of Blanche*. In all editions of Chaucer subsequent to that of Speght in 1597, however, it is given to a poem which had been hitherto unrecognized. Although little is known as to the origin or history of the latter piece, there is no reason to doubt the authenticity of the authorship. The earliest manuscript of it which has come down belongs to the year 1550.

CHAUCER SOCIETY, The. A society founded in 1867 in London, by F. J. Furnivall, for the purpose of facilitating Chaucerian research and opening a knowledge of the great poet's works to the public.

CHAUCHARD, shō'shär', Hippolyte François Alfred (1821–1909). A French merchant and art collector, born in Paris. He was first employed as a clerk, but in 1854 founded the Magasins du Louvre and through the introduction of methods now universal in modern department stores built up a great fortune, with which he retired in 1885. His art treasures, including "The Angelus" and six other Millets, 40 Corots, several Rousseaus and Meissoniers, bronze statues, and tapestries, were left as a gift to the French nation.

CHAUCI, kâ'sī. An ancient German tribe which dwelt along the North Sea, between the Amisia (Ems) and the Albis (Elbe). The Romans often came into conflict with them, notably during the reign of Claudius (41–54). Tacitus (*Germ.* 35) records that they were conspicuous for their love of peace and justice, powerful but not ambitious, ready to resist aggression, but never provoking war. After the fifth century they disappear from history.



GEOFFREY CHAUCER

FROM AN ENGRAVING BY GEORGE VERTUE

AFTER THE MINIATURE IN A MANUSCRIPT OF THE WORKS OF THOMAS OCCLEVE

CHAUDESAIGUES, shō'dzāg' (Fr. trans. of Lat. *Calentes Aquæ*, hot springs). A watering place of France, in the Department of Cantal, about 12 miles south-southwest of Saint-Flour (Map: France, S., G 4). It is widely known for its five hot mineral springs with a maximum temperature of 177°, the waters of which are considered very efficacious in cases of rheumatism and are also used for domestic purposes, washing fleeces, etc. There are also three cold springs near by. Pop. (commune), 1901, 1645; 1911, 1675.

CHAUDET, shō'dā', ANTOINE DENIS (1763–1810). A French sculptor, painter, and draftsman. He was born in Paris, studied with J. B. Stouf and E. Gois, and won the Prix de Rome in 1784. He was the favorite sculptor of Napoleon I, of whom he modeled many busts and statues. The most imposing of these, a colossal statue for the Vendôme Column, was destroyed in 1814. Other well-known works are the stone relief "Devotion to the Fatherland" (Panthéon), "Sensibility," "Œdipus" (Louvre), a silver statue of "Peace" (Musée des Arts Decoratifs, Paris), "General Dugommier" (Versailles). His best painting is "Æneas Fleeing with his Family," in imitation of the style of David. He also furnished good illustrations for editions de luxe of the day, such as Didot's *Paul and Virginia* and Racine's dramas. Chaudet's art united classic severity of form with a certain pathos which at times becomes sentimentality. He was an imitator of Canova, to whom some of his works have been ascribed.

CHAUDIÈRE (shō'dyâr') **LAKE** (Fr., caldron). An expansion of Ottawa River in Canada, just above the city of Ottawa, at which place the Chaudière Falls occur (Map: Ontario, J 2).

CHAUDIÈRE RIVER. A river of Canada which rises near the northwest border of Maine, in small head streams which flow into Lake Megantic, from which the Chaudière River issues. It flows generally north-northwest to join the St. Lawrence, about 7 miles above Quebec. It is about 120 miles long. The falls of the same name are 2½ miles above its mouth. See CHAUDIÈRE LAKE.

CHAUFFEUR, shō'fĕr' (Fr., burner), or GARROTTEUR. A member of the bands of outlaws during the Reign of Terror in France who roamed over the northeastern part of the country, under the lead of John the Skinner, or Schinderhannes. They garroted men and women and roasted their feet to compel them to disclose hidden treasure. In 1803 vigorous measures were taken which resulted in their suppression. (See BRIGANDAGE.) With the increasing use of the automobile as a means of recreation and transportation, the term "chauffeur" was applied to the driver who operated the carriage and the mechanic who was carried to look after the machinery and fuel. The origin of this use of the term is found in France, where automobiling first won favor as a sport, the word "chauffeur" being there employed to designate a fireman or stoker. To-day the word has come to be used to signify a professional licensed driver of a self-propelled motor vehicle. See MOTOR VEHICLE.

CHAULIAC, shō'lyăk', GUY DE (c.1300–c.80). A French surgeon. He first practiced in Lyons and was physician to three of the popes of Avignon. He was far in advance of the time, and his *Chirurgia Magna* (1363), written in the vernacular *langue d'oc*, was for three centuries an indispensable manual.

CHAULIEU, shō'lyĕ', GUILLAUME AMFRYE (1639–1720). A French poet, born at Fontenay (le-Comte). He was one of the dissolute abbés of the period and was called "L'Anacréon du Temple." His verses have a grace and facility that makes them still read. His poems were not published during his life. They have usually been printed with those of his intimate companion, the Marquis de la Fare (1644–1712). The best edition is that by Fouquet (1774). Consult Sainte-Beuve, *Causeries du lundi*, vol. i, and Berenger's introduction to Chaulieu's *Lettres inédites* (1850).

CHAUMETTE, shō'mĕt', PIERRE-GASPARD (1763–94). A notorious character of the French Revolution, born at Nevers. Through Camille Desmoulins he was made a member of the Club of Cordeliers, and he soon became connected with one of the revolutionary journals. He preached the downfall of property and religion and stood for the policy of anarchy, pillage, and atheism. He became the real dominating spirit of the Commune. After the events of August 10 he became procureur-syndic of Paris. He was guillotined, April 13, 1794, at the instance of Robespierre. Chaumette was one of the most extravagant revolutionists in an age that had gone mad on revolution. At one time, according to tradition, he proposed that the French people should be made to wear wooden shoes and to subsist on potatoes. With all this, he is entitled to a certain amount of commendation for his hospital reforms, public burial for the poor, the suppression of lotteries, houses of ill fame, and obscene literature. Perhaps his most important reform was the abolition of corporal punishment in the schools.

CHAUMIÈRE INDIENNE, shō'myâr' ăN'-dē-ĕn', LA. See SAINT-PIERRE, JACQUES HENRI BERNARDIN DE.

CHAUMONOT, shō'mō'nō', PIERRE MARIE JOSEPH (1611–93). A French Jesuit missionary in North America. He was the son of a vine-dresser, but was brought up by his uncle, a priest, who lived at Châtillon, on the Seine. At the age of 10 he ran off, with a companion, to study music at Beaune, Burgundy, under the Fathers of the Oratory; but, having stolen 100 sols (about a dollar) from his uncle, and dreading to be disgraced therefor at his home, he made a pilgrimage to Rome, where he fell under the influence of the Jesuits, and in 1639 went to Canada as a missionary to the Indians. Soon after arriving at Quebec, he left for work among the Hurons and for a year was stationed at Ossossane. For some time he busied himself gathering information for a dictionary of the Huron language and dialects and in 1640 accompanied Brébeuf (q.v.) on a mission to the Neutral Nation, a tribe which then lived west of the Iroquois, between Lake Ontario and Lake Erie. This mission proving unsuccessful, he went to St. Michael, where he remained until 1648, when the Iroquois destroyed this settlement, together with nearly all the others in this vicinity, and almost exterminated the Hurons. Chaumonot accompanied the survivors first to St. Joseph's Island, in Lake Huron, and afterward to the Island of Orleans, where he was able to complete the work on his dictionary and prepare a grammar besides. From 1655 to 1658 he worked among the Iroquois at Onondaga and then

spent some time in Montreal, where in 1663 he founded the Society of the Holy Family. He finally returned to the Hurons, among whom he remained until his death. His life was full of hardship, persecution, and suffering, and, like that of the other Jesuit missionaries of the time, was remarkable for its self-abnegation and unobtrusive heroism. Chaumonot left a curious autobiography, *Vie de P. M. J. Chaumonot, écrite par lui-même* (1688), the original of which is in the Hôtel-Dieu, Quebec. It was published by J. G. Shea in New York in 1858. A continuation (to 1693), *Suite de la vie de P. M. J. Chaumonot par un père de la compagnie* (probably Rale), was also published in New York in the same year. For his missionary work and writings, consult Thwaites, *The Jesuit Relations* (72 vols., Cleveland, 1897–1901). The Index volume should be consulted, as accounts of him are found in many volumes.

CHAUMONT-EN-BASSIGNY, shō'môN'-ông-ba'sē'nē (Fr., bald hill). The capital of the Department of the Haute-Marne, France, situated on an elevation between the rivers Marne and Suize, about 140 miles southeast of Paris (Map: France, N., L 4). The railway viaduct across the Suize is a remarkable structure, 1960 feet long with 50 arches. The city is well built, with clean, spacious streets, and fine promenades around the upper part of the town. The church of St. Jean Baptiste exhibits fine examples of Flamboyant Gothic, of Renaissance, and transitional architecture of the thirteenth, fifteenth, and sixteenth centuries, and contains some good paintings and sculptures. Among the town's monuments is a bronze statue of Philippe Lebon, a native and the pioneer of gaslighting in France. There are many manufactures, including wax candles, hosiery, cotton, yarn, leather, kid gloves, etc. There is also a brisk trade in grain, ironware, and coal. The town traces its origin to a baronial castle erected in 940. At Chaumont, on March 1, 1814, the Allied Powers formulated a plan for the reconstruction of western Europe and bound themselves by treaty not to lay down arms till France had been reduced to its ancient boundaries. Pop. (commune), 1901, 14,622; 1911, 14,870. Consult E. Jolibois, *Histoire de la ville de Chaumont* (Chaumont, 1856).

CHAUNA, chou'nȧ. A bird. See SCREAMER.

CHAUNCEY, chän'sĭ *or* chąn'sĭ, ISAAC (1772–1840). An American naval officer. He was born at Black Rock, Conn., and at an early age began a seafaring life in the mercantile service, in which he was conspicuous for enterprise and energy. In 1799 he entered the newly organized navy as a lieutenant, and in 1802 he was made acting captain, commanding the *Chesapeake*, the flagship of the squadron sent against Tripoli. Throughout the War of 1812 he had command on the Great Lakes. In 1813 he participated in the capture of York (now Toronto) and of Fort George, thus helping to drive the enemy from the whole of the Niagara region, and on October 5 he captured five British vessels and a regiment of troops. At the close of the war he was placed in command of the Brooklyn Navy Yard and in 1816 commanded the Mediterranean squadron and, with William Shaler, Consul, negotiated the treaty of peace with Algiers.

CHAUNCY, or **CHAUNCEY,** CHARLES (1592–1672). An American clergyman and educator, the second president of Harvard College. He was born at Yardleybury, England; graduated in 1613 at Trinity College, Cambridge, of which he was for some time a fellow and where for several years he was professor of Greek. He was vicar of Ware from 1627 to 1633 and of Marston St. Lawrence, Northamptonshire, from 1633 to 1637, and in both pastorates came into frequent conflict with the ecclesiastical authorities. He was first called to account for his opposition to the *Book of Sports* and for his presumption in substituting catechetical exercises for the prohibited afternoon sermon, and in 1629 was brought before the Court of High Commission for having said that "idolatry was admitted into the Church," and that "there is much atheism, popery, Arminianism, and heresy crept into the Church." In 1635 he was again brought before the court, this time for objecting to a rail around the communion table, and to the act of kneeling at the communion service, and after trial publicly recanted. In 1638 he emigrated to America and for three years preached in Plymouth; but in 1641 he became the pastor at Scituate, where, says Mather, "he remained for three and three times three years, cultivating the vineyard of the Lord." In 1654 he planned to return to his old pastorate at Ware; but the overseers of Harvard had meantime chosen him to succeed President Dunster and "by their vehement importunity" induced him to remain. From this time until his death he was president of the college. He is the reputed ancestor of all those bearing the name of Chauncy or Chauncey in the United States. Besides a number of sermons he published: *The Doctrine of the Sacrament, with the Right Use Thereof* (1642); *The Plain Doctrine of the Justification of a Sinner in the Sight of God* (1659), a collection of 26 sermons; *Antisynodalia Scripta Americana* (1662). Consult the interesting sketch in Cotton Mather, *Magnalia* (London, 1702), and Fowler, *Memorials of the Chaunceys* (Boston, 1858).

CHAUNTER, chänt'ẽr (OF. *chantur*, It. *cantatore*, Lat. *cantator*, singer, from *cantare*, frequentative of *canere*, to sing). The highest pipe of the bagpipe (q.v.) on which the chaunt, or melody, is played.

CHAUS, kā'ŭs (Neo-Lat., from the native name). The Indian jungle cat (q.v.).

CHAUSSARD, shō'sär', PIERRE JEAN BAPTISTE (1766–1823). A French author. He was born in Paris and was educated at the Collège Saint-Jean de Beauvais. In 1792 he was sent as commissioner to Belgium to effect a union with that country and upon his return was appointed Secretary General of Public Instruction. His *Mémoires historiques et politiques sur la révolution de Belgique et du pays de Liége* (1793) is an important contribution to the history of that period. He wrote on the art of poetry, supplementing Boileau.

CHAUSSES, shōs (Fr., stockings). In the Middle Ages, defensive armor for the legs. Some were made of padded and quilted cloth, with metal studs; some of chain mail, some of riveted plates, and some of banded mail. It was not unusual to fasten them by lacing behind the leg.

CHAUSSON, shō'sôN', ERNEST (1855–99). A French composer, born at Paris. He studied under Massenet and César Franck at the Paris Conservatory. For several years he was secretary of the Société National de Musique. He died as the result of an accident with which he met

while wheeling. His works attracted more than ordinary attention because of their strong individuality and excellent workmanship. He wrote two operas, *Hélène* and *Le Roi Arthur*, which was produced in Brussels in 1903; a symphony in B flat; two symphonic poems, *Viviane* and *Les caprices de Marianne*, and several smaller pieces for orchestra; incidental music to Shakespeare's *Tempest* and Bouchor's *Légende de Ste. Cécile;* the vocal works with orchestra *Hymne Védique, Le poème de l'amour et de la mer, Chanson perpétuelle;* a concerto for piano and orchestra; a concerto for violin and piano with string quartet; a piano quartet; a string quartet, and a string trio.

CHAUTAUQUA, shâ-tą'kwâ. A town in Chautauqua Co., N. Y., popular as a summer resort, and noted for its educational facilities and its picturesque situation 1427 feet above sea level, 68 miles by rail from Buffalo, on the Chautauqua Traction and the Jamestown, Chautauqua, and Lake Erie railroads, and on the western shore of Chautauqua Lake (Map: New York, A 6). Steamboats ply on the lake, which is reached by several railroads. The town has a hotel and numerous cottages, and among features connected with the educational work of the Chautauqua Institution are an amphitheatre with a seating capacity of 5000, the "Hall in the Grove," three gymnasiums, and an athletic club, administration building, and buildings for lectures, recitations, etc. The New York State Summer Institute also is situated here. Pop., 1900, 3590; 1910, 3515.

CHAUTAUQUA INSTITUTION. A name adopted from a lake and a county in southwestern New York, which has during the past third of a century become associated with a system of popular education now generally known, but by many only vaguely understood. The fundamental principle of this system is that the higher education may and should be extended to all alike, and that education, best begun in academy, college, and university, is not confined to youth, but continues through the whole of life. Broadly speaking, the influence of the institution is twofold—it is exerted through the summer assembly and summer schools directly upon those in attendance; and, by means of reading circles upon self-educating readers and students in their own homes. Correspondence instruction, formerly undertaken by the institution, has been abandoned. These two plans may be successfully combined, for, by supplementing home study during the year with six weeks' residence at Chautauqua in the summer, a conscientious and persevering student may do work of a high grade and acquire valuable and broadening information. The function of the institution in the educational system of the United States is, therefore, compensatory and supplementary. While its methods cannot be by any means an adequate substitute for college training, they may stimulate personal development among ambitious persons denied college opportunities and among all classes may encourage habits of systematic reading and study.

The Summer Assembly. The first Chautauqua Assembly (known as the "Sunday-school Assembly") was in session Aug. 4–18, 1874, as the result of a plan formed by Lewis Miller, of Akron, Ohio, and the Rev. John H. Vincent, of New York. Both men were interested in the improvement and development of Sunday schools. To this end they devised a meeting which should be more than a mere conference of two or three days, and which should include courses of study in pedagogical principles, biblical analysis, and practical questions of Sunday-school organization and management, extending over a period of 10 days or two weeks. The plan also recognized the importance of recreative exercises and of certain lectures of a general character not strictly related to the main subject of Sunday schools. It was decided to hold this "assembly" in camp, to adopt the unquestionably good features of the so-called camp meeting, but to give prominence to the calm, earnest, careful study of important principles and methods. Although the plan originated with members of the Methodist Episcopal church, there was no thought of making the assembly denominational. At the first session all the leading Protestant bodies were represented, and there has never since been any attempt to make distinctions. The attendance in 1874 was gratifyingly large. In spite of primitive lodgings and many discomforts, there was a spirit of enthusiasm which promised well for the success of the experiment. The Sunday-school Normal Department provided means for daily study under experienced instructors; prominent speakers gave lectures of a popular character on biblical themes. A large model of Palestine (300 feet long) was laid out near the lake (which served as the Mediterranean), and students were conducted through this miniature land by Oriental travelers.

The assembly plans widened rapidly in successive years. The system which had succeeded in the case of Bible study was quickly extended to include science, language (the teaching of Hebrew began in 1875), and literature. Music of a better grade was introduced, and a large chorus was drilled daily. This expansion has continued, until now the staff of lecturers and instructors numbers more than 200 men and women prominent in all departments of educational life. Every year at least one well-known British scholar is invited to cross the Atlantic especially to lecture at Chautauqua. Gradually, progressive courses on some one topic have been substituted for miscellaneous addresses on a great variety of subjects. In 1876 the session was lengthened to three weeks and now covers 60 days of each year. Thus began the Chautauqua Assembly, based on the theory that change of occupation, not idleness, is true recreation, and that the summer vacation may be made a means of development and stimulus to those engaged during the year in the ordinary pursuits of life.

Summer Schools. In 1879 a school for teachers in secular subjects, called "The Teachers' Retreat," was opened, with a faculty of efficient instructors. This department has grown steadily in numbers and importance and is a leading summer school of methods. It is now the School of Pedagogy. In the same year (1879) the School of Languages (now the College of Liberal Arts) began, with courses in German, French, Latin, Greek, Hebrew, and Sanskrit. The development of this school has been marked by important changes, largely due to Dr. William R. Harper, late president of the University of Chicago, who became instructor in Hebrew in 1882 and principal from 1884 to 1898. In 1888 the School of the English Bible (now the School of Religious Teaching) was organized, also under the principalship of Dr. Harper. This department, designed to promote the study of the Bible as a great literary masterpiece as well as an inspired

volume, was received with immediate favor and has grown rapidly. In addition to these three schools many other subjects of study have been added, until there are now 14 distinct departments under the presidency of George E. Vincent, son of the founder of the institution. These various schools are as follows: (1) School of English Language and Literature; (2) School of Modern Languages; (3) School of Classical Languages; (4) School of Mathematics and Sciences; (5) School of Pedagogy; (6) School of Religious Teaching; (7) School of Library Training; (8) School of Domestic Science; (9) School of Music; (10) School of Arts and Crafts; (11) School of Expression; (12) School of Physical Education; (13) School of Practical Arts; (14) School of Agriculture, added in 1912 in coöperation with Cornell University. Many of these schools are under the direction, or command the services, of professors from the leading universities and colleges of the country. About 3000 students avail themselves each year of these facilities.

In addition to the instruction given in these schools, the public programme includes: (1) a variety of lecture courses on the university-extension model, in which a number of lectures are given by one professor and at which the attendance is large; (2) public lectures and addresses by men and women prominent in various departments of life; (3) recreative and æsthetic entertainments, such as concerts, dramatic recitals, stereopticon lectures, etc. The public programmes are divided into series, each extending over a week and many emphasizing in the discussions some great movement of the time. No additional fee is charged for these lectures and entertainments, and they form a most popular and most successful part of the assembly work.

The Chautauqua Literary and Scientific Circle. Probably Chautauqua is best known in connection with the plan of systematic home reading. In 1878 at Chautauqua this plan was proposed and explained. The announcement went out to the press, and the first year 7000 persons were enrolled. From that time, every autumn and winter, readers varying in number from 8000 to 25,000 have joined the circle. During this period more than 300,000 persons have taken this work. About 50 per cent of these have done continuous work for two years, and about 60,000 have completed the four years' course.

The system was founded in the belief that thousands of ambitious men and women were only waiting for definite suggestion and aid in reading. The plan consists of: 1. A four years' course of reading, including selections in English from the ancient classics, history, economics, literature, and art. Each year of the four is devoted especially to a great nation and is known as "The Modern European Year," "The Classical Year," "The English Year," or "The American Year." No attempt is made to study language or mathematics. The course is general and follows in a measure the subjects taught in the average college; it gives what has been called the "college outlook." 2. Certain books, many of them specially prepared by well-known authors, are designated each year by a council of six prominent men. 3. A weekly (monthly up to 1913) magazine, the *Chautauquan*, containing supplementary articles on the subjects of the course by the leading writers of the day; general miscellaneous matter on current affairs; several departments designed to aid the reader, such as apportionment of the course by the week or month, notes on the books, outlines of reading, word studies, etc. 4. A membership book, sent to each reader, including analyses of the required books, and question papers (memoranda), to be filled out and returned to the office. These papers are intended to aid the reader in reviewing and systematically arranging the facts and principles he has learned. They are not examinations, nor are they regarded as such. 5. Local circles, which may be formed in any community where three or more readers desire the benefit of comradeship. More than 10,000 such circles have been formed. 6. A certificate, granted at the end of the course to all who state in writing that they have faithfully read all the required literature. Such certificate has no significance beyond the fact stated, and, of course, has not the significance of a degree.

The readers enrolling each year are known as a "class" and assume the numeral of the year during which their course is completed, after the plan of American colleges. This device, with the thought that so many people in this country and in foreign lands are reading the same books at the same time, creates a certain spirit of fraternity and enthusiasm that contributes to the success of the plan. For those who have completed the four years' course, or for others, there are many special courses in history, literature, science, and art, which enable a reader who has found a congenial subject in the general course to pursue a specialty. There is also a plan by which these special courses may be directed by correspondence with one or another college professor. More than 75 such specialized courses are offered. The importance of continued reading is always emphasized.

In 1902 a new charter was granted to Chautauqua Institution in the nature of an amendment. It states that the purpose and object of the institution shall be to promote the intellectual, social, physical, moral, and religious welfare of the people. To this end it may hold meetings and provide for recreation, instruction, health, and comfort on its grounds at Chautauqua: conduct schools and classes; maintain libraries, museums, reading and study clubs, and other agencies for home education; publish books and serials, and do such other things as may further its general purpose.

Present Status. Architecturally the summer city of Chautauqua has kept pace with the progress of the plan. All the schools and classes are provided with suitable buildings; there are public lecture halls of capacity varying from 200 to 5000, and for other than collegiate purposes there are four clubhouses, three gymnasiums, an imposing colonial market place, and various other community buildings. A large organ and a chime of eight bells are among the possessions of the institution. The revenue is collected, like the customs dues of a foreign city, at the gates. No public "collections" are ever taken. A tax is levied upon all who enter and become members of the community. The institution carries the municipal idea beyond mere material matters to include public instruction and entertainment. All exercises, except class instruction in the college, are free to any one within the town limits, and a ticket giving all the educational privileges of the assembly may be had at a nominal price.

Local Assemblages. There are now throughout the United States and Canada over 550 local assemblies modeled after the original Chautauqua Institution. Most of these are local in their influence; but a few, such as the Champlain Assembly at Plattsburg, N. Y. (see CATHOLIC SUMMER SCHOOL), and the Jewish Chautauqua at Atlantic City, N. J. (see JEWISH CHAUTAUQUA SOCIETY), are doing work quite similar in character to that at Chautauqua. There is no organic relation between these local assemblies and the original, but most of them adopt as a part of their regular work the home reading courses of the mother institution.

Bibliography. Vincent, *The Chautauqua Movement*, with introduction by Miller (Boston, 1886); *The Chautauquan Magazine* (Chautauqua, N. Y., 1880–), *The Chautauqua Assembly Daily Herald; The United States Bureau of Education, Report* (Washington, 1891–92, 1894–95, 1899 1900); Martin, *Social Circles and how to Form them* (Boston, 1888); *Chautauqua Reading Circle Literature* (Meadville, Pa., 1896–97); Raymond, *About Chautauqua: As an Idea, as a Power, and as a Place* (Toledo, 1886); Bray, *A Reading Journey through Chautauqua* (Chautauqua, 1905).

CHAUTAUQUA LAKE (Seneca *t'kenchiata'kwen*, one has taken out fish there). In Chautauqua Co., western New York, 730 feet above the level of Lake Erie, and about 1300 feet above sea level (Map: New York, A 6). It is 18 miles long and about 2 miles wide, with an outlet into Conewango Creek and thence into Allegheny River. It drains only a small area, having no large feeding streams. The lake is in a country famed for its scenery, and on its banks is the celebrated Chautauqua Summer School. Mayville is at the head of the lake and Jamestown at the foot, on the outlet.

CHAUVEAU, shō'vō', PIERRE JOSEPH OLIVIER (1820–90). A Canadian statesman and writer, born and educated in Quebec. He was elected to the Provincial Legislature in 1844 and became Solicitor-General in 1851 and Provincial Secretary in 1853. In 1855 he was appointed superintendent of education for Lower Canada. On the organization of Confederation in 1867 he became Premier of the Province of Quebec and in 1873 was chosen Speaker of the Dominion Senate. He was appointed professor of Roman law in Laval University in 1878 and at one time was president of the Royal Society of Canada. Besides poems, he published: *Charles Guérin, roman de mœurs canadiennes* (1852); *L'Instruction publique au Canada* (1876); *François-Xavier Garneau, sa vie et ses œuvres* (1883); *Bertrand de la Tour* (1898).

CHAUVEAU-LAGARDE, shō'vō' là'gärd', CLAUDE FRANÇOIS (1756–1841). A French advocate, born at Chartres. He defended Marie Antoinette, the Princess Elizabeth, General Miranda, Brissot, and Charlotte Corday before the revolutionary tribunal. Apprehended and imprisoned, he escaped death through the fall of Robespierre. In 1828 he became a counselor of the Court of Cassation. He wrote a *Note historique sur le procès de Marie-Antoinette et de Madame Elisabeth* (1816).

CHAUVENET, shō've-nā', WILLIAM (1820–70). An American mathematician, one of the charter members of the National Academy of Sciences. He was born in Milford, Pa., graduated at Yale in 1840, was professor of mathematics in the navy from 1841 to 1859, and assisted in the establishment of the Naval Academy at Annapolis and of its observatory, of which he was made director. He became professor of mathematics and astronomy in 1859, and chancellor in 1861, in Washington University, at St. Louis, Mo. In 1870 he was president of the American Association for the Advancement of Science. Among his works are an excellent *Treatise on Plane and Spherical Trigonometry* (1850) and a *Manual of Spherical and Practical Astronomy* (1863). Consult "Memoir of William Chauvenet," in the *Biographical Memoirs of the National Academy of Sciences* (Washington, 1877).

CHAUVINISM, shō'vĭn-ĭz'm. The name given in France to a policy of excessive national self-glorification, accompanied by an attitude of aggressive hostility to everything foreign. Chauvin was the name of an old battle-scarred veteran of the Empire who adored the memory of Napoleon and who was continually talking of his achievements at Austerlitz and Jena, and his determination to take a brilliant revenge for Waterloo. The vaudevillists of the day—Scribe, Cognard, Bayard, and Dumanoir—seized upon him as a subject for the comic stage, and since then a *Chauvinist* has come to mean a man who has extravagant and narrow-minded notions of patriotism and enmity towards foreign people, equivalent to the English word "Jingo."

CHAUX-DE-FONDS, shō de-fôN', LA (Fr., deep line). A town in the Canton of Neuchâtel, Switzerland, 9 miles northwest of Neuchâtel (Map: Switzerland, A 1). It is situated in a dry, barren valley of the Jura, at an elevation of 3070 feet above sea level, and is regularly built, with broad, straight streets, and stone houses. The most notable structures are the aqueduct, 13 miles long; the Protestant church, with a fine, vaulted roof; the hospital; the college, which contains the municipal picture gallery; the historical museum; and the library. Among the educational institutions is a watchmaking and art-engraving school. Chaux-de-Fonds is the second largest watch and clock making centre in Switzerland and also manufactures articles in gold, silver, bronze, and enamels, lenses and scientific instruments. Watch and clock making was begun here in 1705 by Jean Richard. Pop., 1900, 36,015; 1910, 39,597.

CHAVANNES. See PUVIS DE CHAVANNES.

CHAVANTÉAN, chä'vän-tā'ăn. A South American tribe, whose language forms a distinct stock, situated in the region of the upper Paraná and lower Paranapanéma, about 20° S. lat., in the State of São Paulo, Brazil. These "Chavantés" are to be distinguished from the "Chavantés" (also known as Akua) of Goyaz and Matto Grosso, who belong to the Tapuyan stock. The independent character of their language was recognized by Von Ihering in 1905. Consult H. von Ihering, *The Anthropology of the State of S. Paulo, Brazil* (2d ed., S. Paulo, 1906), and Chamberlain, in *Journ. de la Soc. des Amér. de Paris*, N.S., vol. vii, p. 185 (1910), and in *Science*, N.S., vol. xxxvii, p. 344 (1913).

CHAVES, shä'vĕsh (Portug., key). A town and fortress of the second class in Portugal, in Tras-os-Montes, near the Spanish frontier, situated on a plain on the right bank of the Tamega, which is here crossed by an old Roman bridge of 12 arches (Map: Portugal, B 2). In the neighborhood are saline springs, which are much

frequented, and the remains of a Roman bath-house. Because of its position near the Spanish frontier it was long maintained as a strongly fortified place, and its name "Chaves" is due to its being one of the "keys" of the North. Its industries consist of silk and linen weaving. Pop., 1900, 6463.

CHAY (chā) **ROOT** (Tamil, *chaya*), CHOYA, or SAYAN (*Oldenlandia umbellata*). A perennial herbaceous plant of the family Rubiaceæ, said to be a native of India. It is cultivated on the coast of Coromandel for the sake of its long, orange-colored roots, the bark of which affords a beautiful red dye. The quality of the bark is said to be improved by keeping it for some years. It is the coloring matter obtained from chay root which is used to paint the red figures on chintz. Chay root is the Indian madder, and with it some tribes in Ceylon formerly paid their tribute.

CHEAP'SIDE (ME. *chepe*, AS. *cēap*, bargain, ultimately connected with Lat. *caupo*, innkeeper + *side*). A street in London extending from St. Paul's Churchyard east to the Mansion House. It is famous for its fine stores, especially of jewelers and mercers, and for its historical reminiscences. It was originally an open square crossed by Watling Street (q.v.), where fairs, markets, and the like were held during the Middle Ages. It is from its mediæval use that it received its name. The square was narrowed down into a street after the "Great Fire."

CHEAT (abbreviation of *escheat;* OF. *eschet*, ML. *excadere*, from Lat. *ex*, out + *cadere*, to fall). As a term of English criminal law, cheat has a narrower signification than in popular usage. For example, a man may be induced to sell goods on credit to another by the false representation of the latter concerning his financial responsibility and thus be defrauded; but such fraud by the purchaser does not amount to a common-law cheat. To constitute that offense, false weights and measures, or a false token, coin, or sign must be used, or there must be a *conspiracy* (q.v.) to defraud. It was punishable as an offense against public trade rather than against an individual. By statute, both in England and in the United States, many fraudulent acts are indictable which did not amount to common-law cheats. See FALSE PRETENSES.

CHEAT. See BROME GRASS.

CHEAT RIVER. A river of West Virginia, formed of four confluents, rising in the eastern part of the State in the Alleghany Mountains, and uniting in Tucker County (Map: West Virginia, E 2). It flows through a region rich in iron and coal and joins the Monongahela River in Pennsylvania, 4 miles from the State line. It is about 125 miles long, but drains a rather narrow area, owing to the conformation of its watershed. It furnishes abundant water power and in portions of its course flows through narrow gorges amid magnificent scenery.

CHEATS, THE. A comedy by John Wilson written in 1662, published in London, in quarto, in 1664, and performed by Killegrew's company at Vere Street, Clare Market, in 1663. It is a satirical farce in mockery of the Nonconformists and excited so much disapprobation that it was soon withdrawn.

CHEATS OF SCAPIN, skā'păn', **THE.** A farce by Otway, performed in February, 1677, and published in the same year, bound up with the author's *Titus and Berenice*, which had been first produced at the same performance. A second edition appeared in 1701. It is a close adaptation of Molière's *Les fourberies de Scapin* and was played as far down as the end of the eighteenth century. The first edition was dedicated to Lord Rochester.

CHEBEC'. The least flycatcher (*Empidonax minimus*), a small, olive-green garden bird, common in the eastern United States, so named from its sharply accented call note. See PEWEE, and Plate of EGGS.

CHEBOYGAN, shē-boi'gan. A city and the county seat of Cheboygan Co., Mich., 166 miles north by west of Bay City, on the Michigan Central and the Detroit and Mackinac railroads, and on Lake Huron, at the mouth of the Cheboygan River (Map: Michigan, E 3). It has a good harbor, connected with lake ports by regular steamship lines, and has some reputation as a summer resort. The lumber interests are important, and there are large tanneries, canning factories, shipyards, and saw and paper mills. Settled in 1849, Cheboygan was incorporated in 1877. It is governed by a mayor and a city council. The water works are owned by the city. Pop., 1900, 6489; 1910, 6859.

CHECHEN. See TCHETCHEN.

CHECK, or **CHEQUE.** A bill of exchange (q.v.) drawn on a banker payable on demand. Such is the definition given in the English Bills of Exchange Act, 1882 (45 and 46 Vict., c. 61, § 73), and in the Negotiable Instruments Law, which has been adopted by a number of the United States. (See Laws of New York, 1897, c. 612, § 321.) In a few States it has been held that an instrument drawn upon a printed blank-check form, and differing from an ordinary check only in that it was payable on a day subsequent to its date, is a check, as distinguished from a bill of exchange. Such was not the prevailing view, however, even before the statutes above referred to. It is not necessary that a check be drawn by a customer on his banker, nor that it be drawn against funds, although ordinarily it is so drawn; and a person who obtains money on a check which he knows is drawn by one not entitled to draw for the amount specified therein commits a fraud and may be liable to criminal punishment. A check is intended for prompt presentment, and not for use as a continuing security; and when presented it is to be paid by the banker and canceled, not accepted and returned to the holder. In the United States the usage of certifying checks prevails. The liability of a bank which certifies a check drawn upon it is the same as that of a drawee who accepts a bill. The effect of certification upon the drawer's liability depends upon whether it was procured by the holder or by the drawer. If the drawer procures it, he remains liable on the check as the drawer of an accepted bill of exchange, payable on demand. If the holder procures it, the drawer and indorsers are discharged from liability. In other words, the holder in the latter case chooses to substitute for payment by the bank its promise to pay. Mere delay in presenting a check does not discharge the drawer, unless loss is caused to him thereby. At common law, if the delay did result in loss, as where the bank failed during the period of delay, the drawer was discharged in toto. By the English Bills of Exchange Act and the American Negotiable Instruments Law this has been modified, and he is discharged only to the extent of the loss caused by the delay.

Crossing checks is an English usage which does not prevail in this country. It consists (1) in writing across the face of the check the words "and Company" between two parallel lines, or in simply drawing two parallel transverse lines across the face; or (2) in writing across the face the name of the banker. The first is called a general crossing, the latter a special crossing. A crossed check is payable only when presented through a bank, and one crossed specially is payable only through the bank specified. The usage was introduced as a protection and safeguard to the owner of the check, but it did not restrain the negotiability of the instrument. The Bills of Exchange Act provides that if the crossing is accompanied with the words "not negotiable," a person taking the check shall not have, and shall not be capable of giving, a better title than that of the person from whom he took it.

In most respects other than those mentioned above, checks are governed by the rules which apply to bills of exchange. Consult the authorities referred to under NEGOTIABLE INSTRUMENTS.

CHECK'ERBER'RY. See GAULTHERIA; PARTRIDGE BERRY.

CHECK'ERED BEETLE. A beetle of the serricorn pentamerous family Cleridæ, so named because of its variegated markings. Some of them are antlike in form and coloration. The adults are found on flowers, such as *Spiræa*, and on trunks of trees, where they subsist on nectar and sweet sap. The larvæ live under bark and feed on wood-boring larvæ, even penetrating into the burrows in search of them. Some infest the hives of bees, where they devour the young bees, burrowing their way from cell to cell, and still others feed on dead animal matter. A synopsis of the North American species, by J. L. Le Conte, will be found in the *Annals* of the Lyceum of Natural History of New York, vol. v (New York, 1849).



A CHECKERED BEETLE.

CHECK'ERS (OF. *eschequier*, from ML. *scacarium*, chessboard, from *scacci*, chess, from Pers. *shāh*, king), or DRAUGHTS (Dutch *dragt*, Ger. *Tracht*, burden, from AS. dragan, to draw, Ger. *tragen*, to carry). A game played with "men" on a checkered board, made square, divided into 64 equal square spaces, colored alternately black and white, or any two strongly contrasted colors. The draughts, or checkers, are circular and flat. There are many varieties of checkers—Chinese, English, Polish, Spanish, Italian, and Turkish. A similar game was played by the Egyptians as early as 1600 B.C., and a form of it was popular in ancient Greece. The game is also found among the native tribes of the interior of New Zealand. In France it is called *les dames*, from its having been a favorite game with ladies; in Scotland the draught-board is called the *dambrod*.

Two persons play this game, each having a set of 12 men—one set black, the other white. The men may be placed either on the black or white squares, but they must all be placed on one color only. In England it is usual to play upon the white squares, with a black square to the lower right, and in Scotland upon the black, with a white square to the lower right, The men may be moved diagonally only, and by one square at a time. If an enemy's man stands in the way, no move may take place unless there be a vacant square beyond into which the piece can be lifted. The man leaped over is then taken and removed from the board. The object of the game is to clear the board of the enemy's men, or to hem them in so that they cannot be moved, and whichever party does so first wins the game. As no piece can move more than one step diagonally at a time, there can be no taking till the antagonists come to close quarters, and the advancing of them cautiously into each other's neighborhood is the chief art of the game. When a man on either side has made his way, either by taking or by a clear open path, to the opposite side of the board, he is entitled to be "crowned," which is done by placing another man on the top of his man. Crowned men may move either backward or forward, but always diagonally and by one square at a time, as before, and this additional power gives a great advantage to the player who owns the greatest number of "kings," and usually decides the game in his favor. Joshua Sturges's work, entitled *The Guide to the Game of Draughts*, first printed in 1800, edited by Kean and last published in 1892, is the standard authority. The rules and many diagrams will be found in *Spalding's Home Library* (New York). Consult also *Foster's Complete Hoyle* (New York, 1909) for different forms of the game, openings, etc.

CHECK'ING. In arithmetic, one of the oldest and best methods of checking the results of operations in decimal arithmetic is known as *casting out nines*. It originated at an early date among the Hindus, and from them it passed to the Arabs. Proofs for this rule appear in the works of Avicenna in the tenth century. Luca Pacioli (1494) adds this check to his work on division, pointing out cases in which it fails. Its use in elementary schools has been neglected more on the continent of Europe than in England, and not until recently has the method been seriously urged by American teachers. The process may be best explained by an example.

Required to check the multiplication, $35 \times 34 = 1190$:

(1) Dividing 35 by 9, the remainder is 8;

(2) Dividing 34 by 9, the remainder is 7;

(3) Dividing 56 (the product of 7 and 8) by 9, the remainder is 2;

(4) Dividing 1190 by 9, the remainder is likewise 2.

Therefore the product, 1190, is probably correct.

According to a proposition in the theory of numbers, the remainder (called the *excess*) arising from dividing a number by 9 is the same as that arising from dividing the sum of its digits by 9. Hence the above remainders may be obtained thus: (1) $3 + 5 = 8$; (2) $3 + 4 = 7$; (3) $5 + 6 = 11 = 9 + 2$; (4) $1 + 1 + 9 + 0 = 9 + 2$ as before.

In the case of addition the excess in the sum is equal to the excess in the sum of the excesses of the addends. Thus, in $635 + 234 = 869$, $6 + 3 + 5 = 9 + 5$, $2 + 3 + 4 = 9 + 0$, $8 + 6 + 9 = 2 \times 9 + 5$, but $5 + 0 = 5$; therefore the sum 869 is correct.

From the identity of division, dividend = divisor $\times$ quotient + remainder, it appears that the excess in the first member must equal that in the second. Hence the check for division is made to depend upon that for addition and

multiplication. Thus, in $8765 = 42 \times 208 + 29$, $8 + 7 + 6 + 5 = 2 \times 9 + 8$; $4 + 2 = 6$, $2 + 0 + 8 = 9 + 1$, $2 + 9 = 9 + 2$; $6 \times 1 + 2 = 8$; but $8 = 8$, therefore the division is correct.

In practice the sum of the digits is rarely found. As soon as the addition produces 9, this is rejected, and so on. Thus, in 180136, $6 + 3 = 9$, $1 + 0 + 8 = 9$; hence 1 is the excess.

If the result obtained from any operation differs from the true result by a multiple of 9, the check evidently fails, as is also the case if the result differs from the true result by having certain digits interchanged. These cases, however, rarely occur. Any number could be chosen for the purpose of checking, but the excess for 9 is easier found than that for any other number not having more exceptions to its efficiency.

The method of casting out nines is only one of several important checks used in mathematical operations. In algebra one of the principal checks is that of arbitrary values. Thus, in the multiplication of $a^2 + 2ab + b^2$ by $a + b$, the product is $a^3 + 3a^2b + 3ab^2 + b^3$. This may be checked by substituting any arbitrary values for a and b, as $a = 2$, $b = 3$, giving $5 \times 25 = 125$. There is also the check of homogeneity, likewise illustrated by the above multiplication, where the product of two homogeneous functions of degrees 1 and 2 respectively is also homogeneous of degree $1 + 2$. Functions which are, as in the above case, symmetric with respect to certain letters, also give rise in general to functions symmetric with respect to those letters when one is operated upon by the other, thus suggesting a simple check. The use of checks characterizes the work of all who have to perform operations of various kinds in any of the branches of mathematics, and the importance of the subject can hardly be overestimated. Consult Beman and Smith, *Higher Arithmetic* (Boston, 1895).

CHECKY, chĕk'ĭ, or **CHEQUEE,** chĕk'ê (OF. *eschequé*, from *eschequer*, to check). The name given in heraldry to a field or charge composed of small squares of different tinctures, generally metal and color. See Plate of Heraldry.

CHEDDAR (chĕd'dar) **CHEESE.** See Cheese; Cheese Making.

CHEDORLAOMER, kĕd'ôr-lâ-ō'mĕr. A king of Elam, who, according to Gen. xiv, conquered Palestine, but 13 years later was forced to make an invasion in order to establish his authority. He was accompanied by Amraphel (q.v.) of Shinar, Arioch (q.v.) of Ellasar, and Tidal of Goyim. Having conquered the Rephaim, the Zuzim, the Emim, and the Horites, and proceeding as far as El Paran, he returned by way of En Mishpat, slew the Amalekites and the Amorites in Hazezon Tamar, and defeated in a pitched battle the five kings of Sodom, Gomorrah, Admah, Zeboiim, and Zoar, but was smitten near Dan by Abram, who rescued his nephew, Lot. Concerning the historical character of this narrative as a whole many scholars entertain grave doubts. Chedorlaomer is indeed a possible Elamitish name, as Kudur occurs in Kudur Nanchundi and Kudur Mabuk, and Lagamar is the name of an Elamitish goddess. Three cuneiform tablets have been found dating probably from the Achæmenian and the early Seleucid periods, in which some scholars have seen a reference to King *Kudur Lagamar*, but the name in the first is only *Kudur* KU KU *mal*, in the second *Kudur nuch* (?) *gu mal*, and in the third, *Kudur nuch* (?) *gu;* the first also has the names *Erim aku* and *Tudchula*, and the second *Eriekua*. When these men lived is not indicated in the inscriptions. Tudchul may be identical with Tidal, as the guttural *ch* may represent the letter *ayin*, and it has been suggested that Goyim is a textual error for Gutim. Eri Aku may be the same as Rim Sin, a son of Kudur Mabuk, who actually reigned in Larsa, Aku being the Elamitish equivalent of Sin, the name of the moon god. There can be little doubt that Amraphel represents Hammurapi (2124–2081 B.C.). An invasion of Palestine by an Elamitish king is not improbable. But there is as yet no direct evidence from the monuments of any of these kings. While it is thought by some scholars that the names were found by a Babylonian Jew and put into connection with the story of Abram, others regard it more probable that a Palestinian cuneiform source was used. The names of the kings of the submerged cities (see Sodom) are regarded by some as symbolical and fictitious, while others maintain that they are of a type that may be expected in Palestine at the time, and are drawn from the same document. This difference of opinion also applies to Melchizedek (q.v.). We have no means at present of determining whether Abram was mentioned in the original source. The whole chapter is supposed by some students to be a *midrash* written as late as in the fourth century B.C., and some late touches are generally admitted even by those who prefer in so delicate a matter to suspend judgment until more archæological evidence can be obtained. Consult, especially, King, *Letters and Inscriptions of Hammurabi I* (London, 1898); Clay, *Light on the Old Testament from Babel* (Philadelphia, 1906); Meinhold, *I Mose 14, Eine historisch-kritische Untersuchung* (Giessen, 1911); Dhorme, in *Revue Biblique Internationale* (1908); Pilter, "Some Amorite Personal Names in Gen. xiv," in *Proceedings of the Society for Biblical Archæology* (1913).

CHEDUBA, chĕ-dōō'ba, or **MANAUNG.** An island off Arakan, Burma, in the Bay of Bengal, stretching from lat. 18° 40′ to 18° 56′ N., and from long. 93° 28′ to 93° 46′ E. Area, 308 square miles. Pop., 1901, 26,899; 1911, 30,197 (Map: Burma, B 3). The soil is fertile, yielding rice, tobacco, sugar, indigo, cotton, hemp, and large quantities of a vegetable oil, equally fitted for burning and for varnishing. The principal mineral is petroleum. The island is of volcanic origin and still contains an active volcano in the northwestern corner. The coast has earthy cones, which emit mud and gas. The town of Cheduba, or Manaung, in the northeast, has a population of 1540.

CHEE'CHA (native name). A gecko (*Hemidactylas frænatus*) of Ceylon, India, and the Orient, 4 or 5 inches long, which is semidomesticated. "It makes its appearance soon after sunset, about the walls of the Indian dwellings, in search of flies and other small insects. If some attention be shown it, however, it will present itself every evening at the accustomed place, . . . soon becoming very tame." See Gecko.

CHEE'LA, or **CHILA.** See Serpent Eagle.

CHEER PHEASANT, chēr fĕz'ant. A crested pheasant (*Catreus wallichi*), of the middle ranges of the Himalayas, which varies from the true pheasants in lacking the bright metallic plumage and in other details. It ranges from

Chamba on the west to Khatmandu in Nepal, being found between 4000 and 10,000 feet elevation according to the season. Flocks of 5 to 15 are found in the vicinity of steep mountain sides, where it scratches vigorously for edible roots and feeds also on berries, seeds, and insects. It breeds in May and lays 8 to 10 eggs. It is the only member of its genus.

CHEERYBLE (chēr'ī-b'l) **BROTHERS, THE.** Twin brothers, Charles and Edwin by name, who are benevolent friends to Nicholas and Kate in Dickens's *Nicholas Nickleby*. They are said to be drawn from the Grant brothers who were Manchester cotton spinners in Dickens's day.

CHEESE (AS. *cēse*, from Lat. *caseus*, cheese). A food product made from milk by separating the curd or casein and portions of the fat and other constituents from the whey, shaping the mass into different forms, and usually ripening or curing it. The product has been known since earliest times, the oldest mention of it dating back to about 1400 B.C. It was a common food material long before butter was known, the references to butter in the Bible being more correctly translated 'curdled milk.' The Greeks were familiar with cheese making at the time of Homer, and Aristotle refers to the renneting of milk with the sap of the fig. Hippocrates mentions cheese made from mare's milk and from goat's milk. Sheep's milk was employed for this purpose by the early Egyptians. The Romans used cheese as food quite extensively and were familiar with several kinds, one similar to Limburger, others flavored with spices and herbs, and some which were smoked in the process of making. Columella gives a very good description of the methods employed in cheese making, and Pliny describes the foreign cheeses to be had in Rome, some of which were quite celebrated.

At the present day more than 150 different kinds of cheese made in Europe and America have been described. These depend for their characteristics upon the kind and condition of the milk used, the process of making, the seasoning, and especially upon the conditions incident to the ripening or curing. (See CHEESE MAKING.) Cow's milk is, of course, mainly used, but in some parts of Europe the milk of goats and sheep is also employed. The milk may be sweet or sour; it may contain different amounts of fat, depending upon whether whole milk, skim milk, or milk to which cream is added is used, and the cheese may be hard or soft, according to the amount of water left in it and the character of the curing. The principal hard cheeses are the common Cheddar cheese, the English Cheshire and Stilton, the Dutch Edam and Gouda, the Schweitzer (Swiss) or Emmenthaler (French product, known also as Gruyère), and the Italian Parmesan and Gorgonzola. Among the soft cheeses are Brie (*Fromage de Brie*), Camembert, Neuchâtel, Limburger, "brick," Philadelphia cream, and cottage cheese, or "smierkäse." The famous Roquefort is a semisoft cheese. In addition to these there are many fancy brands of cheese made in the United States and Canada by mixing ground cheese with cream, or butter, or oils, and sometimes adding a flavoring material, such as Meadow-Sweet, Club-House, Canadian Club, etc. Pineapple cheese is ordinary cheese made very firm and pressed into the shape suggested by its name. In composition cheeses of the same general variety vary quite widely, owing to differences in the richness of the milk used, the amount of water left in the curd, and the age of the product. As cheese ripens and ages, it dries out considerably, losing from 8 to 15 per cent of its water. The water in ordinary factory cheese varies all the way from 15 to over 50 per cent, although in well-cured cheese it usually constitutes about one-third, or 35 per cent. The remainder is solid matter, composed mainly of fat, casein (protein), and a little sugar and ash (mostly salt). Fully one-half of the solids in a whole-milk cheese should be fat; in skim-milk cheese the proportion is considerably less. Van Slyke found the average composition of whole-milk cheese made in New York factories to be: water, 31.5; fat, 37; protein, 26.25; ash, sugar, etc., 5.25 per cent. The average of a large number of American analyses differs but little from this, and is as follows: water, 34.2; fat, 33.7; protein, 25.9; ash, sugar, etc., 6.2 per cent. The average percentage composition of a number of the more common kinds of cheese is shown by the accompanying table.

KIND	Water	Fat	Protein	Sugar, ash, etc.
Cheddar (American)	34 2	33.7	25.9	6 2
" made from partly skimmed milk.	38 2	29.5	25.4	6.9
" made from skim milk	45 7	16 4	31.5	6 4
Pineapple	23 0	38 9	29 9	8.2
Schweitzer	32 7	32.6	29 5	5.2
Edam	34.0	27.4	30.9	7 7
Parmesan	32.7	25.1	36.8	5 4
Stilton (made from milk and cream)	29 1	35.6	27.4	7 9
Cheshire	34.8	29.5	28 6	7 1
Roquefort	38 8	31.5	23 4	6.3
Limburger	42 1	29.4	23.0	5.5
Neuchâtel	43.4	32.3	17.1	7 2
Fromage de Brie	51.4	25 7	17.9	5.0

Many of the foreign cheeses, such as Emmenthaler (Schweitzer), Edam, Neuchâtel, brick, and Limburger, are now successfully made in the United States; but more than nine-tenths of all the cheese made in this country is the familiar standard variety known as Cheddar. The grades of this cheese commonly recognized are: "full cream," made from whole (unskimmed) milk; "skims," made from skimmed or partly skimmed milk; and "filled" cheese, in which foreign fat is substituted for the natural fat of the milk. The latter is the most serious form of adulteration of cheese, and as the product is palmed off as "full-cream cheese," it is to be regarded and should be treated as a fraud. Its base is skim milk, which is very abundant and cheap in creamery districts. The fat added is usually oleo oil or neutral lard, and from these cheap materials it is said that filled cheese can be made for four or five cents a pound. It is not easily detected by ordinary sampling when fresh; but it has little flavor or aroma, and its quality is short-lived. The exportation of considerable quantities of this cheese under fraudulent names has unfavorably affected the export cheese trade of the United States. Several of the dairy States have prohibited its manufacture, and others have enacted laws requiring its proper labeling.

The general reputation of American cheese at home and abroad has also suffered from the extent of the manufacture of skim cheese, or half-skims. While these are regarded as legitimate products, and, if well made, are highly

nutritious, they should always be plainly marked and sold for exactly what they are. Unlike the ripe and finely flavored Parmesan cheese, which is made from skim milk, the American skims are generally flat in flavor, hard, and horny. Several of the dairy States, notably New York and Wisconsin, have passed laws authorizing the use of State brands on cheese made from whole milk, guaranteeing the quality of the cheese so branded. Canada has prohibited by law the manufacture of either skim-milk or filled cheese. It is one of the largest cheese-producing countries, exporting about 200,000,000 pounds a year.

The cheese production of the United States in the middle of the last century was about 100,000,000 pounds a year and at its close about 300,000,000 pounds, from 30,000,000 to 50,000,000 pounds being exported. The total production in 1910 was 320,530,000 pounds. New York and Wisconsin are the two principal cheese-making States, the former making about 50 per cent more than the latter, and both together producing three-fourths of the entire output of the country. Farm-made cheese has been almost entirely superseded by factory cheese. (See CHEESE FACTORY.) From 30,000,000 to 40,000,000 pounds of cheese are annually imported into the United States, nearly one-half coming from Italy (Parmesan and Gorgonzola), and 30 per cent from Switzerland (Schweitzer).

Food Value. In proportion to its bulk, cheese is a highly nutritive food, both as regards tissue-forming material (protein) and as a source of energy (fuel value). The few digestion experiments which have been made with cheese indicate that the protein and fat in it are quite thoroughly digested. Well-ripened cheese is more thoroughly digested than green cheese. As regards ease of digestion, it appears that fat cheese, thoroughly ripe cheese, or that which is porous, is more quickly digested than other sorts. The distress which some persons experience after eating cheese may be due to a variety of causes, such as overindulgence, especially at the end of a hearty meal, eating a concentrated food without proper dilution with other foods, or insufficient mastication. There are undoubtedly some persons who cannot eat cheese, owing to some personal idiosyncrasy not easily explained, just as there are those who cannot eat strawberries or some other food. In general, it may be said that cheese thoroughly deserves the reputation of being a nutritious and wholesome food which it has had for centuries. Cheese is eaten alone, or combined with other food materials. The more highly flavored kinds are most commonly served at dessert and eaten in small quantities, while the mild sorts often replace to a considerable extent meat or other animal food and constitute an important part of the meal. Occasionally cheese causes a severe, or even fatal, illness. This is due to the growth of peculiar microörganisms and the consequent production of poisonous substances called "ptomaines." But these are by no means confined to cheese and are likely to occur in many other highly nitrogenous foods.

For bean cheese, or bean curd, see SOY BEAN.

CHEESE CEMENT. See CEMENT.

CHEESE FACTORY. A place where cheese is made on a commercial scale. The first cheese factory in the United States was established at Rome, N. Y., in 1851, by Mr. Jesse Williams, a farmer and skillful cheese maker. The idea of bringing together the milk from several neighboring farms, to be made into cheese by a skillful operator, has spread extensively throughout the dairy States and has been adopted abroad. In 1869 the number of cheese factories in the United States had reached over 1000, and since that time this coöperative, or factory, system has practically superseded the making of cheese on farms. There are now said to be over 3500 factories in the United States. The advantages of the system are diminished cost of production, a more uniform and superior quality of cheese, a higher and more regular price, and a great reduction of labor at the farm. Cheese factories are operated on two plans—viz., the stock company or coöperative system, under which the farmers own and manage the factory, through proper officers; and the proprietary plan, in which an individual owns and operates the factory, making cheese for the patrons for a certain price, which in New York State is usually one dollar per hundredweight. The milk is hauled to the factory daily by the patrons, the distance being in many instances several miles. Payment for the milk is usually made on the basis of the weight, account being taken of the amount of milk required to make a pound of cheese. The demonstration that the fat content is a reliable index to the cheese-producing value of milk has led some progressive factories to adopt this basis, which is carried out as at creameries (q.v.). There is a wide difference in the size of cheese factories. Some make only 5 or 6 cheeses a day, while others make over 20 in the height of the season. An average-sized factory produces from 8 to 10 cheeses a day, requiring the milk of about 300 cows. The kind made is almost exclusively Cheddar cheese.

CHEESE INSECTS. Insects affecting cheese are as follows: *Cheese hopper*, or *cheese skipper*, the larva of *Piophila casei*, a small, black, shining, two-winged fly, which lays its eggs on cheese, smoked ham, and chipped beef. The white, slender eggs hatch in 24 to 36 hours, and the cylindrical, white, tapering larva feeds voraciously upon the cheese, ham, or beef, completing its growth in from seven to eight days, and remaining in the pupal condition 10 days longer. The name is derived from the fact that the larva will bring the two ends of the body together and suddenly release them, like a spring, jumping in this way for 3 or 4 inches. In the United States this insect plays a more important rôle as an enemy of smoked ham than of cheese. It seems to prefer the outer, fatty portions. The substances attacked should be kept in scrupulously clean, well-aired rooms; the windows should be screened through the summer, and all shelf cracks should be occasionally washed out with a kerosene emulsion. *Checsemite*, a minute, whitish, gregarious mite (*Tyroglyphus siro*) of a genus destructive to flour, sugar, etc., which feeds upon cheese, leaving a brown, powdery mass of shed skins where it has worked. Cleanliness in the place where cheese is kept is the best preventive.

CHEESE MAKING. The making of Cheddar cheese, which is the common cheese made in the United States and Canada, and also extensively in England, may be taken as illustrating the general principles upon which the process depends. The milk used should be free from taint or smell, and of good quality as regards composition. While the casein of the milk is

the part which is curdled and gives the body to the cheese, the fat is an important constituent of the finished product, and it has been conclusively shown that the cheese-producing power of milk is measured by its percentage of fat. Hence the fat content of milk indicates its value for both cheese and butter making. The casein in milk exists in a state of semisolution, from which it is separated or curdled by acids, as in the case of sour milk, or by rennet extract prepared from the stomachs of young mammals. The latter is most commonly used in making Cheddar cheese. Pepsin, which is the active agent of rennet, may be used equally well. The fresh milk is first ripened to the proper degree—i.e., a certain amount of lactic acid is developed in it by keeping it for a short time at about 85° F. The acidity accelerates the action of the rennet. When the milk is sufficiently ripe, the rennet is added in diluted form and stirred in, the milk being held at from 82° to 86° F. Ten or fifteen minutes are required to carry the curdling to the proper stage, after which the curd is cut into small pieces with gangs of steel knives, in order to facilitate the contraction of the curd and the expulsion of the whey. The mass is then stirred gently for about five minutes, and subsequently heated to about 98° or 100°, the result being the formation of more acid and a further shrinkage of the curd. The object in these operations is to separate the whey from the curd with the least possible loss of fat. Most of the fat is inclosed in the curd mechanically, but some little goes into the whey, the amount depending upon the skill of the operator. When the curd has assumed the proper consistency (usually judged by its stringing out in little threads when touched with a hot iron), the whey is drawn off and the curd is allowed to mat together into a solid mass. This is cut up into blocks, which are turned so as to maintain a uniform heat throughout. The development of acid, which continues, changes the character of the curd, and when the hot-iron test shows threads 2 or 3 inches long, the curd is ground, or, more properly speaking, cut, and salted, the salt hardening the curd and checking the further development of acid. It is then pressed to bring it into suitable form and remove any surplus whey. After this it is ripened in cool rooms or cellars. This is an important part of the process and has much to do with determining the general quality and character of the cheese. In it the casein is peptonized and changed to forms which are digestible, and the characteristic flavors are developed. If the temperature of the curing room is too high, the cheese ripens rapidly, but gets off flavor and even spoils; and if the air is too moist, the cheese molds. Low temperature and slow curing are much the safest methods, from 45° to 50° F. being recommended, and even a freezing temperature is employed with success. Cold-cured cheese is smooth and mild, and there is less shrinkage in curing due to water evaporation. To avoid the latter, cheeses are often coated with paraffin.

The losses in cheese making occur in the whey and in drippings from the cheese press. The albumin, a milk constituent similar to casein, is not coagulated by the rennet and passes into the whey. This is true also of the milk sugar, only a little being carried into the curd. The fat of the milk is quite largely (all but 5 or 10 per cent) recovered in the cheese in careful making. The amount of cheese that can be made from 100 pounds of milk depends upon (1) the skill of the maker, (2) the amount of water left in the cheese, and (3) the composition of the milk. As mentioned above, the richer the milk is in fat, the greater the amount of cheese that can be made from it under skillful handling. In recent years successful experiments have been made in making Cheddar cheese from pasteurized milk to which hydrochloric acid is added. This gives a more uniform product, removes the difficulty from tainted milk, and places the process under better control.

In the manufacture of other kinds of cheese than Cheddar the details of the process are modified somewhat, or different kinds of milk are used, or the ripening process is different. In the case of a number of kinds special ferments are introduced into the curd to bring about desired characteristics and flavors. This is true of Roquefort cheese, which was originally made from sheep's milk, but in which some cow's milk is now often used. A mold cultivated upon bread is mixed with the curd, and this gradually permeates the whole mass, giving it a mottled bluish color and imparting a characteristic flavor. The characteristics of Limburger are also due to specific fermentations induced during ripening, which result in a putrefactive odor. This cheese is made from sweet milk, the curd being formed into cakes about 5 inches square and 2 inches thick, and not pressed. The main cause of the putrefactive fermentation during ripening is the extremely moist condition in which it is kept. Successful experiments in making Camembert cheese have been conducted at the Connecticut Experiment Station, which have shown the nature of the peculiar fermentation. Schweitzer cheese is made from perfectly fresh, sweet milk—i.e., without ripening—and is of waxy texture, with large "eyes" or holes distributed evenly through it. The curing covers two stages and is carried on in two cellars to secure the proper conditions. It requires a number of months, a fine Swiss cheese being at least 8 or 10 months old before it is eaten.

The spherical dark-red Edam cheese is made quite similarly to Cheddar cheese, the curd being placed in molds to give it its form. It is sometimes made of partly skimmed milk. The curing process is practically the same as for Cheddar cheese, being continued for at least 8 or 10 months. The color is due to the application of an alcoholic solution of carmine when the cheese is ready for market.

The rich Stilton cheese of England, which is very highly esteemed, is made of milk to which cream is added, and is ripened for two years. This ripening is sometimes assisted by mixing some old grated cheese with the curd. The Italian Parmesan cheese is made from skimmed or partly skimmed milk, much like Cheddar cheese, but is ripened for a much longer time. It is very hard and keeps almost indefinitely. Brie is a rennet cheese made in France for several centuries, using cow's milk to which a coloring matter is added. The familiar cottage cheese, Dutch cheese, or smierkäse, is made of sour milk, no rennet being used, and is eaten while fresh. Part skim milk is often used, or a little cream or butter may be added to the curd. The American Neuchâtel, which comes in little cakes wrapped in tinfoil, is likewise a soft, unripened cheese, to be eaten while fresh, but is made from sweet milk with the addition of

rennet. Buttermilk cheese, a new product devised by the Wisconsin Experiment Station, is made by heating slightly acid buttermilk at 130°–140°, when the curd separates out. It is a soft cheese and keeps only a few days. See also CHEESE; CHEESE FACTORY.

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CHEESE RENNET. See BEDSTRAW.

CHEETA, chē'tà, **CHITA** (Hind. *cīta*, from Skt. *citra*, spotted), or HUNTING LEOPARD. A large tropical cat (*Cynælurus jubatus*). It forms an aberrant genus of the Felidæ, differing from *Felis* prominently by its greater comparative length and slenderness of limb, which enables it to run for a short distance with the greatest speed, probably, of any of the larger mammals, and also by the fact that its claws are short, blunt, and almost nonretractile. It therefore pursues its prey by chase rather than by stealth, and to these doglike characteristics adds a docility unusual among cats. It is about the length of the leopard, but stands much higher; in color it varies from tawny to bright rufous, lighter underneath, marked everywhere except on the throat with small, solid spots of black, which are neither rosettes nor arranged in lines; the length of the crisp, erectile hair ("hackles") on the neck and shoulders is another feature. See Plate of WILD CATS, under CAT.

The cheeta is distributed over nearly all Africa, but commonly only in the equatorial jungles and thence sparingly eastward to India. It is in southern India that it is best known, because there it is kept tame and trained by many wealthy natives for the chase of black buck, etc. The methods of training are described by J. L. Kipling (*Beast and Man in India*, London, 1891) and result often in producing a harmless household pet. When taken hunting, it is driven in a cart, leashed and hooded, so that the sport resembles falconry. As soon as the game is sighted, the attendant removes the hood, the cheeta, quivering with excitement, understanding perfectly the meaning of the movement; and then the freed animal, after a glance to find its prey, rushes forward, overtakes and drags it down; it will, however, use catlike stealth should circumstances suggest. The game is never brought back, but held by the cheeta, which must be found quickly and captured—an operation requiring skill, for its native ferocity has been aroused. Having been rewarded with a draft of blood, it is rehooded and confined. The sport (to which the caracal has occasionally been trained for the chase of birds) is of very ancient date, as appears from its depiction on early Assyrian and Egyptian monuments. It was introduced into Europe by returning Crusaders in the fourteenth century and flourished for two centuries in Italy and France. For particulars, consult article by J. E. Harting in the *Field* (London, Dec. 26, 1885). For general description, see *Royal Natural History*, vol. i (London, 1894); for wild habits in Africa, Drummond, *Large Game . . . of Southern Africa* (London, 1875); for habits and sport in India, Blanford, *Fauna of British India* [mammals] (London, 1888–91); Baker, *Wild Beasts and their Ways* (New York, 1890); Sanderson, *Wild Beasts of India* (London, 1893). Facts and illustrations relating to its use in sport in the Middle Ages may be found in La Croix, *Mœurs et usages des moyen âges* (6th ed., Paris, 1878).

CHEETAL, chē'tŭl, or **CHITAL** (Hind. *cītal*, from Skt. *citra* spotted). The axis deer.

CHEETHAM, chēt'am, HENRY (1827–99). An English clergyman and religious author. He was born at Nottingham, studied at Christ's College, Cambridge, and in 1856 was settled as curate of Saffron Walden, Essex. He held the vicarage of Quarndon, Derbyshire, from 1858 to 1870 and was consecrated Bishop of Sierra Leone in the latter year. In 1882 he resigned to become vicar of Rotherham, Yorkshire. His most important publications are *One Hundred Texts of Irish Church Missions* and a volume of *Sermons.*

CHEETHAM, SAMUEL (1827–1908). An English divine and theologian of the Established church, archdeacon and canon of Rochester. He was born at Hambleton, educated at Christ's College, Cambridge, and was fellow there in 1850 and assistant tutor in 1853–58. From 1863 to 1882 he was professor of pastoral theology at King's College, and from 1879 to 1882 archdeacon of Southwark. He was an editor of the *Dictionary of Christian Antiquities* (1875–80) and published: *A History of the Christian Church during the First Six Centuries* (1894); *The Mysteries, Pagan and Christian* (1897); *Mediæval Church History* (1899); *History of the Christian Church since the Reformation* (London, 1908).

CHEE'VER, EZEKIEL (1615–1708). An American educator. He was born in London, but came to New England in 1637 and assisted (1638) in founding New Haven, where he became prominent as a deacon, a minister, and especially as a teacher. He also taught in Ipswich (1650–60) and in Charlestown and was at the head of the Boston Latin School for 38 years. He prepared the *Accidence, a Short Introduction to the Latin Tongue*, which was used as a textbook for a hundred years. Consult Gould, *Ezekiel Cheever, Schoolmaster* (Boston, 1905).

CHEEVER, GEORGE BARRELL (1807–90). An American Congregational clergyman. He was born in Hallowell, Me., and graduated at Bowdoin College in 1825 and at the Andover Theological Seminary in 1830. Two years later he was installed as pastor of a Congregational church in Salem, Mass. The Unitarian controversy attracted his attention, and he was an earnest defender of the orthodox system. Temperance also became a leading idea, and in 1835 he published in a Salem newspaper "Deacon Giles's Distillery," a bitterly satirical allegory which had a wonderful popularity. The author

was prosecuted and imprisoned a month for libel. He then traveled for some time in Europe and, on his return in 1839, became pastor of the Allen Street Presbyterian Church in New York. He resigned in 1844, and from 1846 until his retirement in 1867 was pastor of the church of the Puritans, New York. During the fierce debate that preceded the Civil War he was an active and uncompromising antislavery advocate. At an early age he began to contribute to the *North American Review* and later wrote much for the *Independent* and the *Bibliotheca Sacra*. Among his published works are: *Studies in Poetry* (1830); *Lectures on the Pilgrim's Progress* (1843); *The True History of Deacon Giles's Distillery* (1844); *Wanderings of a Pilgrim* (1846); *Journal of the Pilgrims at Plymouth in 1620* (1848); *God Against Slavery* (1857); *Faith, Doubt, and Evidence* (1881).

CHEFOO. See CHIFU.

CHEHALIS, chē-hā'lĭs. A city and the county seat of Lewis Co., Wash., 33 miles south of Olympia, on the Great Northern, the Northern Pacific, and the Union Pacific railroads (Map: Washington, C 4). There are saw and shingle mills, and factories of furniture, building materials, etc. Pop., 1910, 4507.

CHEIRANTHUS, kī-răn'thŭs. See WALLFLOWER.

CHEIROLEPIS, kī-rŏl'ē-pĭs (Neo-Lat., from Gk. χείρ, *cheir*, hand + λεπίς, *lepis*, scale). The earliest-known ray-finned fish, found in the Devonian rocks of Europe and North America. The body was slender, about 20 inches in length, and was covered by the regular rhomboidal ganoid scales, which in this genus were very small and reënforced on their inner surfaces by vertical ridges. The skull had almost the normal development of external bones, and the jaws were strong and well provided with teeth. The fins, which had very finely divided rays, consisted of a pair of pectoral, a pair of pelvic, and an anal and dorsal fin, and the tail was heterocercal. *Cheirolepis* is a member of a heterogeneous family of fishes, the Palæoniscidæ. See STURGEON; PALÆONISCUS.

CHEIROMANCY. See CHIROMANCY.

CHEIROTHERIUM, kī'rō-thē'rĭ-ŭm (Neo-Lat., from Gk. χείρ, *cheir*, hand + θηρίον, *thērion*, dim. of θήρ, *thēr*, beast). The name given by Dr. Kaup to the animal which produced the peculiar handlike impressions on the Triassic rocks of this country and Germany. The remains of the animal having been found and its structure made out, this name has given place to the more characteristic one of *Labyrinthodon*. See STEGOCEPHALIA.

CHEKE, chēk, SIR JOHN (1514–57). An English scholar, one of the revivers of classical learning in England during the sixteenth century. He was born at Cambridge, and became a fellow of St. John's College in 1529. He devoted himself assiduously to Latin and Greek, particularly the latter language, then much neglected in England. When the regius professorship of Greek was founded in Cambridge by King Henry VIII, Cheke was appointed to the chair. In 1544 he became tutor to Prince Edward (afterward Edward VI). He became a member of Parliament in 1547, and again in 1552–53, provost of King's College in 1548, and was knighted in 1551.

When Mary came to the throne, Cheke, who was a Protestant and had been Secretary of State for Lady Jane Grey, was stripped of all his possessions and imprisoned. Later he was released and went to the Continent. In 1556 he was seized in Belgium by the agents of Philip II of Spain and brought back to England. Being now compelled to choose between the stake and the Catholic religion, he accepted the latter. Of his numerous writings the most remarkable is his translation of the *Gospel of St. Matthew*, ed. by Goodwin (1843). He lectured on Demosthenes and wrote *De Pronuntiatione Græcæ Linguæ* (1555); through this work he introduced into England a new method of pronouncing Greek. Consult Strype, *Life of Cheke* (Oxford, 1821).

CHEKH (chĕk) **LANGUAGE AND LITERATURE.** See CZECH LANGUAGE; CZECH LITERATURE.

CHEKHOV, chĕ'kŏf, ANTON PAVLOVITCH (1860–1904). A famous Russian writer of the younger school, which includes Gorky, Andreev, and Artsybashev. He was born at Taganrog (southern Russia), and although his parents were uneducated themselves—they were both liberated serfs—he himself received a good education. In 1884 he completed the medical course at Moscow University, but soon he decided to follow a literary career. His early work, dating from 1879, consisted chiefly of humorous sketches appearing in the more popular periodicals under the pseudonym "Chekhonte." Encouraged by the suggestion that he was capable of worthier things, Chekhov approached his work more seriously, and soon he was hailed by literary critics as the greatest figure in Russian literature since the days of Turgenev—a distinction which in a measure is still his. Chekhov died of tuberculosis at 44, but into his short life he crowded the writing of over 150 short stories, a number of plays, and at least one full novel. So popular did he become in Russia that it was no uncommon thing for a collection of his works to sell from 10 to 14 editions in a comparatively short time.

Most of his writings have been translated into German or French. In English only the following are available: "Philosophy at Home" (*Short Stories*, October, 1891); "Sorrow" and "The Biter Bit" (*Temple Bar*, May, 1897), "In Exile" (*Fortnightly Review*, September, 1903); "Street Scene in Russia" (*Canadian Magazine*, April, 1905); "Sleepy-Eye" (*Cosmopolitan Magazine*, June, 1906); "Darling" (*Fortnightly Review*, September, 1906); "Terrible Night" (*Current Literature*, January, 1907); and "Bad Conduct" (*New England Magazine*, January, 1909). There are also in English two collections of Chekhov's tales —*The Black Monk and Other Stories* (1903) and *The Kiss and Other Stories* (1908). His plays accessible in English are: *The Sea Gull* (1905); "The Cherry Garden" (*Yale Courant*, 1908); *The Swan Song* (1912); and "Uncle Vanya" and "Ivanhoff" (in *Plays by Anton Tchekhoff*, 1912).

Chekhov's distinguishing characteristics are extreme compression, strict realism and objectivism, complete aloofness, an unusual mastery of words, and a delicate sense of humor. He has been sometimes called a pessimist; but in view of his charming comedies, especially *The Cherry Garden* (his last and most inspiring play), this charge can hardly be sustained. He represents petty and aimless characters with the same intent that he depicts hypocrites and frauds. As a true realist, he could not avoid them.

CHE-KIANG, chĕ'kē-äng' (Chinese, crooked river). A maritime and eastern province of China, bounded by the Province of Kiang-su on the north, the Pacific on the east, Fu-kien on the south, and Kiang-si and An-hwei on the west. The Chusan Archipelago is also a part of the province. It is the smallest of the provinces and one of the oldest and most fertile parts of the Empire, 36,680 square miles in area. Drained by 14 large rivers (and the Yang-tze-kiang once had a mouth here) and many smaller streams, it produces abundantly tea, rice, cotton, silk, wheat, indigo, and other crops, while the forest and fruit trees comprise every species known in eastern China, so that the people have little need to import materials for food or clothing. Its capital is Hangchow, the centre of the silk district, and on the line of China's partly completed railway system. Ningpo is the chief seaport. Other important cities are Wenchow, a treaty port in the south, and Huchou, on the south shore of T'ai-hu Lake, in the north. In 1899 Italy attempted to gain part of this province, but failed. Pop. (est. in 1910), 17,000,000. Next to Shantung it is the most densely populated province of the Republic.

CHELAN, shĕ-lăn', Lake. A serpentine sheet of water in Chelan Co., Washington, situated amid picturesque mountain and glacier scenery (Map: Washington, E 1). It is over 40 miles long and from 2 to 3 miles wide. It is fed by the Stehekin or Pierce River, on which are the famous Rainbow Falls, 300 feet high, 3 miles above the entrance to the lake. The lake drains at Chelan Falls into the Columbia River. Stehekin, Moore, Lucerne, Lakeside, and Chelan on its banks are summer resorts. Steamers ply on its waters, and there are fine angling and shooting in the district.

CHELARD, shĕ-lär', Hippolyte André Jean Baptiste (1789–1861). A French musician, born in Paris. He studied under Fétis and at the Paris Conservatory under Gossec and Dourlen. In 1811 he won the Grand Prix de Rome and became in Italy a pupil of Baini, Zingarelli, and Paisiello. His first opera, *La casa a vendere* (1815), was produced in Naples; but his second, *Macbeth* (book by Rouget de Lisle), was not brought out till 1827. Its failure discouraged Chelard, who retired to Munich and rewrote the entire work. In revised form it met with considerable success, and its composer was appointed court kapellmeister at Munich. In 1829 he returned to Paris and opened a music store, but upon its destruction in the revolution of 1830 he returned to Munich. He conducted German opera in London (1832–33), and in 1836 was called to Weimar as kapellmeister of the Grand Duke. His successful operas, *Der Student* (1831); *Mitternacht* (1831); *Die Hermannsschlacht* (1835), his best work; *Der Scheibentoni* (1842), and *Der Seekadett* (1844), were all produced in Germany. He died in Weimar. A posthumous opera, *L'Aquila romana,* was produced in 1864 in Milan.

CHELIDONIUS, kĕl'ĭ-dō'nĭ-ŭs, Benedictus (?–1521). A Benedictine monk. His true name was Schwalbe ('a swallow'), of which the name by which he is better known is a Græco-Latin punning translation. While in the abbey of St. Egidius, in Nuremberg, built by the Emperor Conrad III in 1140 for the Scotch Benedictines, he wrote, in 1511, the Latin verses to Albert Dürer's cartoons on "The Apocalypse," the "Passion of Christ," and the "Life of the Virgin Mary," besides poems on his monastery and its abbots. His love of learning earned him the nickname "Musophilus." In 1515 he became abbot of the Scotch Benedictine monastery of the Virgin Mary in Vienna, and there he died, Sept. 8, 1521.

CHELIUS, kā'lĭ-o͝os, Maximilian Joseph von (1794–1876). A German physician, born in Mannheim and educated at the University of Heidelberg. He was professor of surgery in Heidelberg from 1817 to 1864, where he contributed greatly to the advancement of the science. His works include: *Ueber die Amputation im Fussgelenk* (1846); *Ueber das Staphyolm der Hornhaut* (1847); *Handbuch der Chirurgie* (8th ed., 1858); *Ueber die Heilung der Blasen-Scheidenfisteln durch Kauterisation* (1845); *Zur Lehre von den Staphylomen des Auges* (1858).

CHELLEAN, shĕl'ē-an. The designation applied by French archæologists to one of the oldest epochs of man in Europe, named from Chelles, in the Department of Seine-et-Marne. The climate of the Chellean epoch was warm and humid, and the flora of the Seine valley was that of the Mediterranean basin, and the fauna characterized by the hippopotamus, rhinoceros, and *Elephas antiquus.* The fact of man's existence there rests on the occurrence in vast numbers of the leaf-shaped, chipped flint implement called by the French Chelléan. Consult Mortillet, *Le préhistorique* (Paris, 1900). See Paleolithic Period.

CHELLES, shĕl, Jean de (?–c.1270). A French architect and sculptor, famous for having built and decorated the beautiful portal of the south transept of Notre Dame in Paris (begun in 1257), with its sculptured portal and rose window. The contemporary chapels of the nave are also probably by him, and he may have had a hand in the building of the original Louvre.

CHELMINSKI, chĕl-mĭn'skē, Jan (1851–). A Polish genre and battle painter. He was born at Brzostov, Russian Poland, and studied in Warsaw under Kossaks and at the Munich Academy under Wagners, Brandt, and Franz Adam. The years 1884–87 he spent in the United States. After that he passed much time in London and in Paris, where he took up his residence. His early works are principally military and hunting subjects. Attractive and lively in execution, they met with great success. Among them are: "Stag Hunt in the Time of Louis XV" (1876); "Morning in the Ukraine"; "Empress of Russia on a Fox Hunt" (1888). These were followed by a series of battle pictures from the wars of Napoleon, particularly the deeds of the Polish legion. More recent works are "The Outskirts of Soissons, 1814" (1907), "Reconnaissance in the Mountains" (1910), "Pursuit of a Courier, 1812" (1911).

CHELMSFORD, chĕmz'fērd. The county town of Essex, England, at the confluence of the Chelmer and the Cann, 30 miles east-northeast of London (Map: England, G 5). The town contains factories for making agricultural implements and electric appliances, iron foundries, breweries, and grain mills. Its chief trade is in agricultural produce. It has large and important corn and cattle markets. Pop., 1901, 15,572; 1911, 18,008. Chelmsford belonged to the Bishop of London from Anglo-Saxon times to 1545. It was a prosperous town under the Edwards.

CHELMSFORD. A town in Middlesex Co., Mass., 4 miles southwest of Lowell, on the New York, New Haven, and Hartford and the Boston and Maine railroads, and on the Merrimack River (Map: Massachusetts, E 2). It is the seat of the Middlesex County Training School and contains Adams Library, Silver Lake, and a number of old houses of historic interest. The town is in an agricultural and fruit-growing region and has woolen and worsted mills, machine shops, and cotton-scouring plants. It is governed by a board of three selectmen. Pop., 1900, 3984; 1910, 5010.

CHELONIA, kē-lō′nĭ-ȧ (Neo-Lat. nom. pl., from Gk. χελώνη, *chelōnē*, tortoise), or TESTUDINATA (Neo-Lat. nom. pl., from *testudo*, tortoise). An order of reptiles, having the body protected above and below by bony expansions forming shields usually covered with horny plates. It is the least variable of the reptilian group and comprises the turtles, tortoises, terrapins, carets, etc. See TORTOISE and TURTLE, under which heads a description of fossil forms will also be found.

CHELSEA, chĕl′sē (AS. *Celchyp*, Chalkport, from *celc*, chalk + *hyp*, port). Formerly a suburban village of London, England, on the north bank of the Thames, 4½ miles southwest of St. Paul's, and now a metropolitan and parliamentary borough of Greater London (q.v.) (Map: London and Vicinity, E 6). From the sixteenth to the eighteenth century it was a place of aristocratic habitation and is now the chief literary and artistic residential section of London. During the nineteenth century George Eliot, Rossetti, Whistler, and Carlyle, "the Sage of Chelsea" (whose house in Cheyne Row is preserved as a public memorial to him), were residents. The celebrated Ranelagh and Cremorne Gardens were situated here. Bridges connect Chelsea with Battersea, on the south bank of the river. Its features of note are the Chelsea Hospital (q.v.); the Royal Asylum for Soldiers' Children; military barracks; the old church of St. Luke's, built in 1307–27, one of the most interesting of metropolitan parish churches; the Sloane Botanic Gardens; the London Water Works of 1772, and the "Embankment," a favorite riverside promenade. Chelsea porcelain has been famous since the eighteenth century. Pop., of borough, 1891, 72,954; 1901, 73,856; 1911, 66,385. Consult: Martin, *Old Chelsea* (London, 1888); Beaver, *Memorials of Old Chelsea* (London, 1890); Davies, *Chelsea Old Church* (London, 1904).

CHELSEA. A city in Suffolk Co., Mass., and a suburb of Boston, from which it is 3 miles distant, on the Boston and Maine Railroad (Map: Massachusetts, E 3). It is connected with Charlestown by a bridge across the Mystic River, and with Boston by ferry and steam and electric railroads. The principal public buildings are the courthouse, city hall, United States naval and marine hospitals, Frost Hospital, soldiers' home, public library, State armory, and Ye Olde Pratt House. The city contains also Union Park and public playgrounds, and a soldiers' monument. Though Chelsea is principally a residential place, it has manufactures of rubber goods, woolens, foundry and machine-shop products, shoes, brass goods, wireless apparatus, boxes, lithographs, stoves and furnaces, tiles, pottery, etc. The city owns and operates its water works. The government is vested in a mayor, elected annually, and a board of aldermen, one elected from each of the five wards, and four at large. The board elects the city clerk, treasurer, solicitor, auditor, assessors, messenger, clerk of committees, and commissioners of sinking fund, and, upon nomination of the executive, all other municipal officials. The mayor's clerk alone is appointed by the mayor. The annual income of the city for 1913 was $274,637. The principal items of expenditure were: police department, $60,736; fire department, $73,534; schools, $199,230. Pop., 1890, 27,909; 1900, 34,072; 1910, 32,452.

First settled in 1626 as Winnisimmet, Chelsea was part of Boston from 1634 to 1638, when it was incorporated as a town under its present name. Here, in May, 1775, occurred a sharp skirmish between a body of British troops and 1000 Americans under Stark and Putnam, the latter being victorious. Chelsea was incorporated as a city in 1857. Out of parts of Chelsea the present towns of Winthrop and Revere were created. In 1908 a great fire occurred in Chelsea, causing the destruction of 17,000,000 dollars' worth of property. The city recovered from this loss rapidly, however. Consult Winsor, *Memorial History of Boston* (4 vols., Boston, 1880–81).

CHELSEA. A town and the county seat of Orange Co., Vt., 22 miles south by east of the State capital, Montpelier (Map: Vermont, E 5). It has manufactures of lumber, bobbins, and dairy products. Pop., 1890, 1230; 1900, 1070; 1910, 1074.

CHELSEA CHINA. Chinaware made in Chelsea, London, between 1745 and 1784. Its leading marks are an anchor and triangle.

CHELSEA HOSPITAL. An asylum in Chelsea, London, for disabled and superannuated soldiers. It was founded by Charles II, who built the present building in 1682–92, on the site of the College for Religious Controversy (Protestant) founded by James I in 1609. Originally one day's pay per year and two in leap year were deducted from the pay of soldiers in service in order to defray the hospital expenses. This deduction, however, has long since ceased, and the asylum is maintained by parliamentary grant and governed by a board of commissioners appointed by the crown, who are charged also with the duty of awarding all pensions granted by the British government. The initial plan of giving all pensioners accommodation in the asylum has been necessarily abandoned. The in-pensioners in 1913 numbered 558, and the out-pensioners 84,393.

CHELSEA VILLAGE. A former village, now a part of New York City. In the early part of the nineteenth century it formed the farm of Clement C. Moore, author of "'Twas the Night before Christmas," who, when on the point of abandoning it on the ground of its distance from the city, was persuaded to sell it in building lots. The name is still in use by old residents and is preserved in Chelsea Square, between Twentieth and Twenty-first streets and Ninth and Tenth avenues, the site of the General Theological Seminary.

CHELTENHAM, chĕl′t'n-*ȧm* (village on the Chelt). A municipal and parliamentary borough and fashionable watering place in Gloucestershire, England, 8 miles northeast of the city of Gloucester (Map: England, D 5). It lies in a picturesque valley, on the Chelt, a small stream which rises in the adjacent hills and flows into the Severn. It is sheltered on the east and

southeast by a semicircle of the Cotswood Hills. The town is regularly laid out and well built and has fine public promenades, gardens, terraces, and squares. Among its numerous churches, the parish church of St. Mary's, dating from the fourteenth century, is a fine example of Gothic architecture. The town was incorporated in 1876. It returns one member to Parliament. Modern improvements include electric lighting, an excellent water supply, and a system of sewerage in connection with three large sewage farms. A public library, an art school, baths, a cattle market, and slaughter-houses are also maintained. Cheltenham has become famous for its colleges and schools, among which are the grammar school (founded in 1574), Cheltenham College, training colleges for school-teachers, and many private schools. Its popularity, however, is chiefly due to its mineral springs, considered to be especially efficacious in cases of dyspepsia and affections of the liver. In consequence, such a large proportion of the resident population consists of Anglo-Indians that the town has been nicknamed "Asia Minor." The Cotswold Hunt holds its meets here and draws many visitors during the hunting season. Roman remains have been discovered on the site of the town. It is mentioned in *Domesday Book*, but it was not until the discovery of its mineral springs, in 1716, that it began to rise into importance. The visit of George III in 1788 set upon it the seal of fashion. Its growth in the nineteenth century was very rapid. Pop., 1901, 49,439; 1911, 50,035.

CHELYUSKIN, CAPE. See SEVERO.

CHEMICAL FIRE ENGINE. See FIRE ENGINE.

CHEMICAL HARMONICON. See HARMONICON, CHEMICAL.

CHEMICAL NOTATION. See CHEMISTRY, *Chemical Formulas.*

CHEMICAL SENSE IN ANIMALS. The capacity of an animal for particular mental processes conditioned upon the chemical constitution of the stimuli acting upon it. The criterion of the chemical sense is to be found, as are, indeed, the criteria of all the senses, in the specialized mode of behavior with which the animal responds to the particular class of objects concerned. Many of the lowest forms of animals (e.g., amœba) respond to the presence of chemicals in their environment in the same way that they respond to mechanical contact with a solid object; they cannot, however, be said to give evidence of a chemical sense, since the identity of response to mechanical and chemical stimuli shows no indication of a special experience concomitant with the one kind of stimulation and not with the other. A very little higher in the biological scale the specialized response is found; while still higher there seems to be a difference in the reaction of the animal to substances in solution and to those diffused in air—a difference which has led to the discrimination of two senses, taste and smell.

Among the cœlenterates we first find evidence of a separate chemical sense. Hydra responds to food by seizing it with its tentacles, a performance never elicited by mechanical stimulation. Sea anemones exhibit at least two responses to chemical substances. In the one, the positive reaction, a particle of food is seized by the outer tentacles and passed on by means of the inner tentacles to the mouth. In the other, the negative reaction, the tentacles withdraw in the presence of certain chemicals, such as quinine. In both of these animals the difference in the character of response to chemical and mechanical stimulation indicates an independent chemical sense. In other members of the group, however, the response to both sorts of excitation is the same, although the chemical stimulus seems to be more readily effective, or, as is the case in jellyfish, effective only in certain parts of the creature. In neither of these cases are we justified in assuming the existence of a separate chemical sense. (For form of behavior as sole index of mental processes, see ANIMAL PSYCHOLOGY.)

As we progress higher in the evolutionary scale, the evidences of the chemical sense become more abundant and more striking. The flatworms show a fairly complex feeding reaction. One form of earthworm will burrow only in the presence of the juices from manure, which constitutes its usual environment. There is some evidence for both taste and smell in snails. Starfish perceive food at a distance, and may even be made to follow a bit of meat about an aquarium. Most of the Crustacea (crabs, crayfish, etc.) show a general restlessness when in the presence of food, and it is thought that in some forms chemical stimulation is effective in guiding the male to the female. Spiders give evidence of smell, in that they will move away from glass rods, dipped in certain oils, which are held behind them.

In insects there is a remarkable development in the sense of smell, both in respect to sensitivity and in respect to the number of discriminable smell qualities. Evidence of extreme olfactory sensitivity is seen in the mating of moths. A male moth, when liberated over a mile away, has been known to find the only female in the region within a very short time. A female of another species, hatched in a region where the species was practically unknown, was visited, within a few hours after she became mature, by 60 males. When the female was placed in a tightly sealed box, however, no males came.

Ants appear to be sensitive to a considerable number of different smell qualities, which play an important part in determining their complex behavior. Ants apparently distinguish the smell of food and of their larvæ and discriminate between nest mates and foreigners also in terms of smell. They are guided in the paths to and from the nest very largely, although not entirely, by smell, and it has been suggested that the ability of certain forms to recognize, upon coming at random across a path, the direction to the nest as distinct from the direction from it, is in some way due to an olfactory perception. The fact that the antennæ, which bear the organs of smell, are movable, makes it possible that ants may have an olfactory space perception not unlike tactual space perception in man.

Bees are, perhaps, no less well endowed for olfactory discrimination, although vision plays a more important rôle in their habits than it does with ants. One investigator finds evidence of a large number of specifically different smell qualities—the smell of the individual workers, of the queen, of the drones, of the larvæ, of food, of wax, and of honey.

There is no conclusive evidence for a chemical sense in fishes, amphibia, or reptiles, although

it is suspected in fishes. Most birds are probably without the power of smell.

In spite of the lack of experimental work upon mammals, there is no doubt that in general they possess the capacity for both taste and smell, aquatic animals, such as whales, porpoises, and seals, forming a probable exception as regards smell. In most other members of the group olfactory sensitivity is very great and the power of discrimination remarkable. Not only can they sense very faint odors, but those animals, like the dog, which are primarily dependent upon smell in their daily life, appear to be able to isolate a single smell component within a highly complex mixture.

For details of behavior of particular forms, see articles under those animals. For method of interpretation of observed data and for bibliography, see ANIMAL PSYCHOLOGY. See also CHEMOTAXIS; TROPISM, *Chemotropism*.

CHEMICAL SOCIETY, AMERICAN. A society founded in 1876 for the discussion of subjects connected with and allied to chemistry. The society holds annual meetings, frequently in conjunction with other scientific societies. The membership in 1913 was 6673, including 14 honorary members, 13 life members, and 64 corporation members. Two journals are published, the *Journal of the American Chemical Society* and the *Journal of Industrial and Engineering Chemistry*. The first is edited by W. A. Noyes, and the second by M. C. Whitaker. There is also published a series of *Chemical Abstracts* edited by A. M. Paterson.

CHEMISTRY. The science of the various material substances that are capable of existence, of their relations to one another, and of the laws governing their various transformations.

The Name. The origin of the word "chemistry" is uncertain. *Chemia* (or *Chemi*) is the old name of Egypt, and as the art of making gold and silver was first practiced in that country, the *science of chemeia* (*χημεία*) may have meant originally 'the science of Egypt.' Later, however, at the time of the Alexandrian alchemists, the word was used to denote some substance; and as, on the one hand, the word *chemi* means 'black,' and, on the other hand, the first step in the transmutation of metals is known to have been a process of blackening, we conclude that *chemeia* may at that time have denoted the 'philosopher's stone,' i.e., the substance employed in the process of blackening the metals. Similarly, in the form *al-kîmiyâ*, the term is used also by the early Arabic writers to denote, not their art, but a substance employed in that art. With them, however, the term was used in much the same sense as the word *al-iksîr*, and this suggests another possible derivation. The word *iksîr* is derived from the Greek *xēros* (*ξηρός*), which means 'dry.' Possibly, then, the word *kîmiyâ* may have been derived from the Greek *chymos* (*χυμός*), which means 'liquid'; and while at one time both *iksîr* and *kîmiyâ* were used to denote a substance, the words *chymeia* (*χυμεία*) and *alchymy* gradually came to denote the art in which that substance was employed, the substance itself (the philosopher's stone) retaining only the name *al-iksîr*.

The Branches of Chemistry. The facts of chemistry have been grouped in a variety of ways, either in the interests of research or according to their usefulness in connection with kindred sciences or with the arts. Hence such titles as Animal, Vegetable, Medical, Astronomical, Metallurgical Chemistry, etc., which in a general way explain themselves. Chemistry proper may be considered as comprising the following four branches: analytical, descriptive, general, and applied. *Analytical chemistry* may be defined as the art of determining the composition of substances; under the names of technical analysis, physiological analysis, etc., many of its methods form an important part of applied chemistry. *Descriptive chemistry* deals with the chemical and physical characteristics of substances; it forms a record of the properties of substances, which are arranged, for convenience of reference or for didactic purposes, in accordance with the principles of general chemistry. The two great subdivisions of descriptive chemistry are *inorganic* and *organic* chemistry, the latter dealing with the compounds of carbon, the former with those of all the other elements. *General chemistry* includes theoretical and physical chemistry, which are usually treated together; theoretical chemistry comprises the laws of the composition and chemical behavior of compounds; physical chemistry treats of the physical properties of compounds, of homogeneous mixtures, and of the physical phenomena (thermal, electrical, etc.) accompanying the transformations of substances in general. *Applied chemistry* comprises all the facts and methods of chemistry that find practical employment. The most important subdivisions of this branch are: (1) biological chemistry, including the chemical facts connected with physiological and pathological phenomena in animals and plants; (2) agricultural chemistry, which deals with problems of rural economy; and (3) industrial, technological, or practical chemistry, which deals with the uses of chemistry in the arts and manufactures.

The Methods of Chemical Philosophy. Like any other science, chemistry may use two different ways in discovering and demonstrating its general principles. On the one hand—and this is the surest way—a principle may be induced from a large number of experimental observations; it is then nothing but the statement of a general fact, and is termed an *empirical law*. Thus, the principle of the conservation of matter is an empirical law. Perhaps this law may suggest itself a priori; but as a law of science it has been induced from facts established by the balance. On the other hand, there are problems which cannot be attacked by experiment. Thus, the problem of the ultimate structure of matter lies far beyond our power of direct observation; yet it is intimately connected with the correlation of substances, and therefore chemistry is compelled to consider it for purely practical reasons. In cases of this nature chemistry, like any other science and like speculative philosophy, makes some plausible assumption, termed a *hypothesis*. Like speculative philosophy, it develops the hypothesis, combines it, if necessary, with other assumptions, and thus builds up a *theory*. But at this point, where speculative research reaches its ne plus ultra, the work of the scientist really begins. The general principles forming part of the theory are busily applied to phenomena capable of direct observation, and then, if their correctness is indicated by actual experiment, they become *theoretical laws*. A scientific theory has for its object, first, to correlate seemingly different facts, and, secondly, to throw light on the road of in-

vestigation and lead to the establishment of new facts. Thus, the atomic theory of chemistry has correlated the various chemical substances with regard to their composition and constitution, and it has revealed the possible existence of innumerable compounds many of which have since been actually prepared—an achievement not unlike the discovery of Neptune by theoretical astronomy.

SUBSTANCES

The Chemical Elements. Some 80-odd among the many thousand substances known to chemists have been classed together as the chemical "elements." They include the pure metals (gold, silver, iron, tin, zinc, etc., but not the alloys, like brass) and, on the other hand, a set of substances (carbon, sulphur, phosphorus, oxygen, nitrogen, hydrogen, etc.) called "the metalloids." A list of elements may be found in the article ATOMIC WEIGHTS.

A priori the mind almost refuses to accept the belief that the universe is built up of a number, like 80, of substances, each of which is ultimately simple and unrelated to the others. At all periods in the history of scientific thought men have rather inclined to the belief in the qualitative unity of matter, to the idea that the substances and materials found in nature or prepared artificially consist essentially and ultimately of one and the same thing, a *single* primordial matter. Towards the very end of the nineteenth century we find so keen a chemical thinker as Van't Hoff expressing the opinion that the elements may yet be decomposed when we have learned to produce high enough temperatures.

However, in spite of such philosophic views held by chemists as well as by scientists in general, the metals and metalloids continued to be regarded as elements and to be classed apart from other substances. For a positive science like chemistry is more securely founded on results of experience, even if such results are not philosophically plausible, than on attractive aprioristic speculation. And experiment had failed to establish any relationship between the substances in question. Thus, centuries of effort directed towards transmuting the baser metals into gold had yielded only negative results. Then, through the various innumerable processes, analytical and preparative, to which all sorts of substances were subjected by chemists in the course of the nineteenth century, the elements remained unchanged and undiminished in amount. Moreover, the spectroscope has shown that the heavenly bodies are made up of the same elements as the earth, which indicates that the highest temperatures prevailing anywhere in nature are still incapable of decomposing our terrestrial elements. While, therefore, the elements were defined, with formal scientific caution and for obvious philosophic reasons, as substances that have *not yet* been decomposed into something simpler and that are *not known* to be related or transmutable into one another, they were really assumed to be as good as absolutely undecomposable, and the name "elements" was retained notwithstanding the prevalent belief that they were ultimately derived from some one substance.

In 1869 Mendeléeff and Lothar Meyer made a discovery (see PERIODIC LAW) which indicated that the elements had very correctly been distinguished as a class of substances different from all others. When, viz., the elements are arranged in the order of their atomic weights, the group exhibits a periodicity of physical and chemical properties which could not possibly occur among a heterogeneous lot of compound substances that simply had not yet happened to be decomposed. But, on the other hand, this same discovery, this very periodicity of properties, also pointed to the existence of an essential family relationship between the elements themselves, and hence, possibly, to their common derivation from one and the same ultimate substance. However, the underlying cause of this periodicity is still not definitely known to-day.

The first decade of the twentieth century brought an even more important discovery: Sir William Ramsay found that the element radium was continually changing into the element helium, and shortly afterward Debierne discovered that the element actinium was likewise changing into helium! This was strong evidence—almost proof—of the essential sameness of the elements. True, the phenomenon was observed only in the exceptional cases of the newly discovered radio-active elements; but the view gained ground that radio-activity was by no means an exceptional property, that in some measure or other it is common to *all* the elements, and hence that *all* the elements are undergoing gradual decomposition—perhaps into electricity, the ultimate primordial material of the universe.

Radio-activity may thus appear to have introduced a profound revolution in chemical science: to have degraded the elements to the rank of decomposable substances and even to have brought back in its wake the ancient alchemist hope of transmuting base metals into gold. This is not the case. That the alchemical hope is not yet more justifiable now than in the past is clear if we consider that radio-active changes are as far beyond human control as the movements of the heavenly bodies: we can observe them as passive spectators; influence them we cannot. Granting even that some base metal might be turned into gold by a radio-active change, we can neither bring about nor control such a change. Nor has radio-activity (notwithstanding its great importance and still greater possibilities) in any sense revolutionized chemical science: the elements of 25 years ago are still listed as elements to-day and are still recognized as substances of an immeasurably high order of stability. The radio-active decomposition of an element is so exceedingly slow that its occurrence has no more significance for the activities of the chemist than the attraction of a distant fixed star has in computations of the orbit of a planet by the astronomer: it is a negligibly small quantity. This is why radium itself, in spite of its continually changing into helium, is unhesitatingly classed with the "elements."

Chemical Compounds. The conception of the almost absolute simplicity and stability of a chemical element defines clearly the distinction between elementary substances on the one hand and compounds and mixtures on the other. The distinction between a chemical compound and a mixture is not easy to define precisely and generally. But before we proceed to formulate this latter distinction, it may be well to consider two simple cases illustrating the formation of true chemical compounds.

First, when hydrogen and oxygen are mixed in certain proportions at ordinary temperatures, a gas is obtained which still exhibits the properties of the two constituents, each of which behaves just as if the other were not present. If the walls of the vessel containing them are porous, both diffuse out, but the hydrogen diffuses out more rapidly; and so it would be if the two gases were confined in porous vessels separately. Now, if we should apply to our mixture sufficient heat, a remarkable change would suddenly set in—an explosion would take place, the hydrogen as well as the oxygen would cease to exist as such, and a new substance (water) would be found in their place. By suitable methods (e.g., by the use of a galvanic current) water may be decomposed into hydrogen and oxygen; but while it exists as water, it has a set of properties all its own and does not exhibit any of the properties of either hydrogen or oxygen.

Secondly, if finely divided iron and finely divided sulphur should be carefully mixed in certain proportions and left at ordinary temperatures for any length of time, the two would continue alongside each other, iron as iron, sulphur as sulphur. A microscope would show two different kinds of particles. A magnet would separate out the iron and leave the sulphur. But again, if we should heat the mixture, a change would take place, accompanied by an evolution of heat and light, and, as a result, we would find a substance (sulphide of iron) which has none of the properties of either sulphur or iron, although these substances may be obtained from it by suitable methods of decomposition.

It is therefore clear that a chemical compound is an "individual" with properties peculiar to itself and different from those of its components; in a mixture each constituent retains its own individuality and may be recognized by its own properties. A compound is invariably found to be homogeneous, even if examined with a powerful microscope; a mixture may be homogeneous, as in the case of hydrogen and oxygen, or it may be heterogeneous, as in the case of iron and sulphur. In separating the constituents of a mixture advantage is taken of the differences in their properties—in the case of hydrogen and oxygen, the difference in diffusibility; in the case of iron and sulphur, the fact that iron possesses magnetic properties while sulphur does not. The properties oftenest taken advantage of for separating substances without destroying their individuality are *volatility* and *solubility;* and on these are based, respectively, the processes of distillation and crystallization.

When a sufficiently stable chemical compound is subjected to one of these processes and is thus gradually divided into two or more portions, the latter are qualitatively identical with one another and with the whole. Thus, when pure water is subjected to distillation, its composition remains unchanged while any portion of it is being removed. The successive portions of the escaping vapor, too, must have the same composition, viz., that of pure water. Similarly, in the case of pure alcohol, when part of a given amount is removed by distillation, the portion remaining undistilled, as well as the distillate, cannot be anything but pure alcohol, and hence cannot but have the same composition as the liquid before the distillation. Quite different is the case of mixtures. Let, e.g., a liquid made up of alcohol and water be subjected to distillation, and let the process be discontinued when a portion of the liquid has passed over. The liquor remaining behind undistilled will then be found to be much weaker, i.e., to contain a greater proportion of water, than the original liquor before the distillation. On the contrary, the escaping vapor will be found to contain a smaller proportion of water than the original liquor before the distillation. The reason is mainly in the fact that water and alcohol are not equally volatile in the mixture; and, of course, the more volatile constituent, viz., alcohol, distills over more rapidly than water, the less volatile constituent. The process of distillation is very often actually employed by chemists when it is required to ascertain whether a given liquid represents a single compound or a mixture. During crystallization, too, a single substance must obviously remain unchanged. Let, e.g., a given amount of magnesium sulphate (Epsom salt) be dissolved in water and allowed to crystallize; any portion of the crystalline matter separating out must obviously have the same composition as the given salt. On the contrary, if every crystal of a given substance contains two or more different compounds—say, magnesium sulphate and zinc sulphate—then any portion crystallizing out from the solution will be found to have a composition quite different from that of the given substance. The reason is mostly in the fact that the constituent substances of a mixture are not equally soluble in water; and, of course, the less soluble constituent will tend to crystallize out more rapidly than the constituent whose solubility is greater.

It must, however, be remembered that certain mixtures, too, retain their chemical composition unchanged when divided into two or more fractions by distillation or crystallization. Thus, alcohol containing about 2 per cent of water will remain absolutely unchanged if divided into fractions by distillation; each fraction will still contain the same percentage of water. A certain mixture of water and nitric acid, and mixtures of certain other substances, are known to behave in the same way. At one time these mixtures were actually taken to be chemical compounds. This view, however, was discarded as soon as it was shown that the composition of such mixtures can be readily changed by changing the conditions under which the distillation or crystallization takes place. If such a mixture is, viz., distilled in an apparatus connected with an air pump, the temperature at which the distillation takes place can be lowered by lowering the pressure, and then the composition will be found to have changed considerably if the liquid is examined after a part of it has passed over. No such thing can be observed in the case of a single chemical compound. Water, e.g., may, by varying the pressure with the aid of an air pump, be distilled at any ordinary temperature, yet its composition will of course remain unchanged. See DISTILLATION.

In accordance with the above considerations, a chemical compound may be defined as *a homogeneous substance which can, by suitable methods, be broken up into elements, but whose composition is not changed by fractional distillation or crystallization carried out under variable conditions of temperature.* This definition is sufficient for most purposes of theoretical and practical chemistry.

The Atomic Theory. Once we have made certain that we shall not, by insufficient definition

of our concepts, confound mixtures of substances with isolated chemical compounds, we are ready to undertake the investigation of compounds, their physical and physiological properties, their composition, and their constitution and reactions, i.e., their chemical properties. The physical properties, such as color, crystalline form, solubility in various solvents, the boiling or melting point, etc., serve the purpose of readily identifying known compounds. A knowledge of the physiological properties of compounds is desirable, because compounds are often capable of therapeutic action and may therefore be used in medicine. The theoretical chemist, however, is interested in all such properties only inasmuch as they are manifestations of the intimate nature of the compounds characterized by them, and his principal aim is to find a precise expression for the dependence of properties on chemical composition and constitution.

The composition of a compound is revealed by chemical analysis, which shows (1) what the constituent elements are (qualitative analysis) and (2) in what relative quantities those elements are contained in the compound (quantitative analysis). A remarkable law that governs the quantitative composition of compounds became known about the beginning of the nineteenth century. This law, called "the law of multiple proportions," may be enunciated in the following form: There is for every chemical element a characteristic number that represents its combining weight; and the composition of any chemical compound may be represented either by the combining weights of its elements or by simple multiples of those weights. Thus, using the combining weights as we know them at present, we may state the composition of a few compounds as follows: carbonic oxide is composed of 12 parts of carbon and 16 parts of oxygen; carbonic acid of 12 parts of carbon and 32 parts of oxygen; water of 2 parts of hydrogen and 16 parts of oxygen; marsh gas of 12 parts of carbon and 4 parts of hydrogen; olefiant gas (ethylene) of 24 parts of carbon and 4 parts of hydrogen, etc. The combining weights of the three elements mentioned are, approximately: carbon, 12; hydrogen, 1; oxygen, 16; and it is easy to see that in stating the composition of our compounds we have been able to use either these numbers or simple multiples of them. Dalton was led to the discovery of this law by the hypothesis according to which all matter is made up of "atoms," i.e., of minute particles incapable of further subdivision. The atomic theory, based on this hypothesis, comprises the following assumptions: The atoms of any given element are identical; the atoms of different elements are different and have different weights; by the force of chemical affinity several atoms may be held in combination, forming a particle, or "molecule," of a compound, and very large numbers of molecules are necessary to make up even the smallest amounts of compounds which we are actually capable of handling. In accordance with these assumptions, let M stand for the number of molecules making up a certain amount of some compound containing two elements; and let the amount of the first element in it be a, the amount of the second element, b. Let, further, A stand for the weight of a single atom of one of the elements, and n stand for the number of such atoms contained in a single molecule of the compound. Then, evidently, the weight a of the first element in the compound equals $M \times n \times A$. Similarly, if A' stand for the weight of a single atom of the second element, and n' for the number of its atoms contained in a single molecule of the compound, then, evidently, the total weight b of the second element in M molecules equals $M \times n' \times A'$. We therefore have

$$a : b : : Mn\,A : Mn'A'$$

or,

$$a : b : : nA : n'A'.$$

In case a molecule of the compound should contain equal numbers of atoms of the two elements, then $n = n'$, and hence

$$a : b : : A : A'.$$

But these proportions tell us that the weights (a and b) of the elements in a compound are proportional either to the weights of single atoms (A and A'), or to multiples (nA and $n'A'$) of those weights. Thus the fundamental law of chemical composition follows as a direct consequence from, and is, hence, completely explained by, the atomic hypothesis, without which it would be a mystery. The "combining weights" mentioned above in connection with our statement of the law are seen, in the light of the hypothesis, to represent the relative weights of the atoms themselves and are therefore termed *atomic weights*.

But while the fundamental assumptions of the atomic theory thus establish a general relation between the quantitative composition of substances and the relative weights of atoms, they do not furnish a sufficient basis for determining these relative weights in an unequivocal manner. When we apply the above proportions to some given substance—say, water—for the purpose of determining the atomic weights of its elements, we find ourselves compelled to make some additional assumption. Indeed, chemical analysis shows that water contains 11.1 per cent of hydrogen and 88.9 per cent of oxygen. We therefore have

$$a : b = 11.1 : 88.9 = 1 : 8 \text{ (nearly)}$$

and hence

$$nA : n'A' : : 1 . 8,$$

where A and A' are, respectively, the weights of single atoms of hydrogen and oxygen, while n and n' are, respectively, the numbers of atoms of these elements in a molecule of water. What we are after is the ratio $A : A'$, i.e., the relative weights of single atoms; but this we evidently cannot find unless we assign some numerical value to the ratio $n : n'$. Dalton assumed that a molecule of water is made up of one atom of hydrogen and one of oxygen, i.e., $n = n' = 1$, and therefore he found

$$A : A' : : 1 : 8,$$

i.e., an atom of oxygen is 8 times as heavy as an atom of hydrogen. (In reality, Dalton thus obtained, for the atomic weight of oxygen, the figure 6; but this was due to his imperfect knowledge of the proportion of hydrogen and oxygen in water.)

Dalton's assumption was quite arbitrary. But in subsequent years, as the substances known grew numerous and complex, chemists began to feel the want of some general theoretical principle which would render arbitrary, and hence confusing, assumptions unnecessary. Then Gerhardt and Cannizzaro enriched Dalton's atomic theory by adding to it a principle which had

been enunciated by Avogadro as early as 1811, but which had remained unemployed as long as it was not urgently needed. According to Avogadro, equal volumes of different gases contain equal numbers of molecules if the temperatures and pressures of the gases are the same. This theoretical principle and its use in determining the atomic weights of the elements have been explained at some length under ATOMIC WEIGHTS and AVOGADRO'S RULE (qq.v.) and require no further discussion here. Suffice it to state that it forms part of the very foundation of the present atomic and molecular theory, and that it is involved in the discussion of most, if not all, problems of modern chemistry.

A still further addition was made to the fundamental hypothesis of the atomic theory before it attained its maximum of possibilities. This last addition, gradually incorporated during the second half of the nineteenth century, consists of certain assumptions concerning the combining forces of atoms, the number of such forces peculiar to the atom of each element, and the directions in which those forces act. (See below, under *Chemical Formulas;* and see the articles VALENCY; CARBON COMPOUNDS; STEREO-CHEMISTRY.) These assumptions, forming the so-called "doctrine of valency," were adopted mainly because of the necessity of explaining the isomerism of organic compounds, i.e., the fact that quite different compounds may have exactly the same composition. And it was mainly when fortified by these assumptions that the atomic theory enabled us to know compounds before they have actually been found in nature or in a chemical laboratory.

Chemical Formulas. In the notation based on the atomic theory, the atoms of the several elements and their relative weights are represented by symbols, such as H for hydrogen, O for oxygen, C for carbon, etc.; H standing for 1, O for 16, C for 12, etc. (A list of elements, with their symbols and atomic weights, may be found in the article ATOMIC WEIGHTS.) When two or more elements combine chemically, their atoms are assumed to become associated in groups (molecules) without being in any way changed. The assumption is based on the fact that the elements of a compound can be reobtained from it in the free state, though we do not know, of course, what really becomes of an element when it combines with other elements; for, as we have seen above, chemical combination usually causes the properties of the elements to disappear more or less completely. In accordance with the assumption, the formula of a compound is made up from the symbols of its elements. For example, the formula of carbonic oxide is CO; that of carbonic acid is CO_2, etc.; C denoting one atom of carbon, O_2 two atoms of oxygen, etc. The formulas at present used by chemists are of three different kinds, viz., empirical, molecular, and graphic.

An *empirical formula*, as the name suggests, may be considered as involving no hypothesis whatever; it is merely the simplest form in which the composition of a compound may be expressed in terms of the atomic weights of its elements. For example, analysis shows that acetic acid contains 6 parts of carbon, 1 part of hydrogen, and 8 parts of oxygen; or—what is the same—12 parts of carbon, 2 of hydrogen, and 16 of oxygen. Using the symbol C to represent 12 parts of carbon, the symbol H 1 part of hydrogen, and the symbol O 16 parts of oxygen, we may denote the composition of acetic acid by the empirical formula CH_2O, which is nothing but a symbolic expression of the results of analysis.

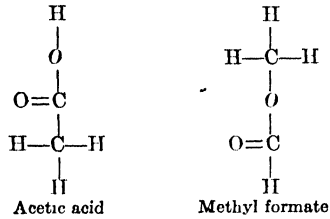
But analysis also shows that certain other substances have the same composition as acetic acid, e.g., the well-known formaldehyde. It is therefore clear that, in order to denote their compounds in a definite manner, chemists must employ formulas which express something else besides composition. Now, Avogadro's hypothesis leads to a knowledge of the relative weight of the molecule of a compound, that weight being, viz., twice as great as the vapor density of the compound referred to hydrogen. (See MOLECULES—MOLECULAR WEIGHTS.) So, to compare acetic acid and formaldehyde, we determine their vapor densities, and as the vapor of acetic acid is found, under proper conditions, to be 30 times as heavy as hydrogen, and formaldehyde vapor is found to be 15 times as heavy as hydrogen, we assign to the acid the "molecular weight" 60, and to the aldehyde the "molecular weight" 30. On the basis of this difference we represent the two compounds, respectively, by the formulas $C_2H_4O_2$ and CH_2O, which have the total weights 60 and 30, while the relative weights of the constituent elements are obviously the same in both. Formulas like these, which denote not only the relative composition of substances, but also their molecular weights, are termed *molecular formulas.* In the case of formaldehyde the molecular formula, CH_2O, happens to be identical with the empirical formula, CH_2O; in many other instances, however, this is not so. A thing exceedingly important to remember is, that *molecular formulas represent practically equal volumes of substances in the gaseous* (or dissolved) *state, under the same conditions of pressure and temperature.* See AVOGADRO'S RULE.

But even molecular formulas do not, in very many cases, suffice to characterize fully the compounds represented by them, for different compounds may have not only the same composition, but also the same molecular weight. Consider, e.g., the "ester" formed by the action of formic acid on wood alcohol. This compound, called methyl formate or methylformic ester, has precisely the same composition as formaldehyde and acetic acid, and precisely the same vapor density as the latter. It must therefore be represented by the same molecular formula as acetic acid:

$C_2H_4O_2$	$C_2H_4O_2$
Acetic acid	Methyl formate

To differentiate compounds like these, chemists use *graphic* or *structural formulas.* Such formulas represent compounds as different because the atoms are differently combined within their molecules, though the kind and number of atoms are the same. To exhibit these differences of combination, chemists employ the assumptions of the doctrine of valency. They assume an atom of hydrogen to be always "uni-valent" because as a rule it is incapable of holding in combination more than a single atom of another element; they assume an atom of carbon to be "quadri-valent" because in marsh gas, CH_4, they find it combined with *four* atoms of hydrogen, and for other reasons of the same nature; and they assume an atom of oxygen to be "di-valent" because in water, H_2O, they find it combined with *two* atoms of hydrogen. With the aid of these assumptions, symbolized by dashes

("bonds") linking together the atoms, they represent acetic acid and methyl formate, respectively, by the following graphic formulas:



Acetic acid Methyl formate

The differences between the two formulas are obvious; thus, the formula of methyl formate shows one of its oxygen atoms as linking together two carbon atoms, while in the formula of acetic acid the corresponding oxygen atom links a carbon atom to an atom of hydrogen. An explanation of the principles used in determining which of all graphic formulas possible in a given case should be assigned to the compound under consideration may be found in the article CARBON COMPOUNDS. To determine the "chemical constitution" of a compound means to determine its graphic formula; for the latter corresponds with, and is therefore a simple expression of, its most important chemical properties.

Graphic formulas often have an abbreviated form; the dashes are omitted, the atoms are combined into groups, and these are written so that their relative arrangement in the molecule may be evident. Such abbreviated expressions are usually employed, for convenience' sake, in preference to the full graphic formulas. Thus, acetic acid is represented by the formula $CH_3.CO.OH$ (or simply CH_3COOH, or CH_3CO_2H); methyl formate is represented by the formula $H.CO.OCH_3$; etc. Remembering the valencies peculiar to the constituent elements, the chemist has no difficulty in reconstructing the graphic formulas from abbreviations of this kind. There is, however, another kind of constitutional formulas, which may be described as incomplete, or imperfect, because they are made up of atomic groups which can be represented, not by only one, but by two or more different graphical schemes. Such formulas are assigned to compounds when we do not know enough about their chemical nature.

Mixtures. We have seen in a preceding paragraph that, while the properties of a chemical compound are quite different from those of its constituent elements, the properties of a mixture are made up by the alligation of those of the components. This is very nearly true in the case of all gaseous mixtures, particularly under low pressures, and one of the general laws of gases is that the pressure in a vessel containing several gases is equal to the sum of the pressures that would be exerted by them if each were isolated in a similar vessel (Dalton's law). But in the case of homogeneous ("physical") mixtures in the solid or liquid state, or even of gaseous mixtures in a highly compressed state, the principle of the "additivity of properties" is only a rough approximation, for in such mixtures the properties of each component are often considerably affected by the presence of the other components. A class of mixtures whose theory forms one of the most important chapters of physical chemistry will be discussed in the article SOLUTION.

TRANSFORMATIONS

We have seen above that when heat is applied to a mixture of hydrogen and oxygen, or to a mixture of powdered iron and sulphur, changes set in which result in the formation of entirely new substances—water and sulphide of iron respectively. Changes of this kind are termed *chemical reactions*. On the other hand, there are changes of matter that are much less profound in their character and involve neither the disappearance of the given nor the formation of new chemical substances. Such changes (mostly changes of state) are termed physical transformations. Thus, e.g., the mere evaporation of water may be spoken of as a physical transformation, because liquid water and water vapor are chemically identical. The science of chemistry deals with physical as well as with chemical transformations, mainly because the former often influence and accompany the latter. Following are the laws governing the various transformations of matter:

1. **Conservation of Mass.** No transformation is known to involve gain or loss of the mass of matter. When, e.g., a candle burns up in the air, its material is not lost; it merely combines with the oxygen of the air to form two invisible products—water vapor and carbonic acid; but these, too, are matter, for they have weight, and their mass is precisely equal to the original mass of the candle, *plus* the mass of oxygen consumed. Hence the inductive principle known as the law of the indestructibility or conservation of mass. A strong argument in favor of this law is found in the fact that in spite of the violent processes undoubtedly taking place in the sun, its weight has not in the least changed within historical times; for an appreciable change in the mass of the sun would have involved a change in the length of the day, and such a change is positively known not to have taken place. Of course, the main evidence in favor of the principle of conservation is presented by the innumerable quantitative processes actually employed by chemists. Besides, accurate investigations have been instituted for the special purpose of testing the precision of the principle and have invariably failed to prove it incorrect. True, radio-active change may possibly, or even probably, involve loss of ponderable mass by the partial dissolution of matter into the imponderable substance of electricity. But radio-active change, as already observed (see above, under the side head *The Chemical Elements*), is too exceedingly slow to require consideration in connection with the processes forming the subject matter of chemical science proper.

2. **Conservation of the Elements.** No transformation, except those of radio-activity, is known to involve the transmutation of one chemical element into another. Combining this with the preceding principle, we get what is known as the law of conservation of the elements. According to this, no ordinary transformation involves gain or loss of the mass of each of the chemical elements, and hence, while an element may exist either free or in a state of chemical combination with other elements, its total mass in the universe may, for all purposes of chemical science, be considered as unchangeable.

3. **Combining Quantities.** While we can mix substances in any desired proportion, chemical combination can only take place between

certain definite relative quantities, which depend on the nature of the reacting substances. Thus, hydrogen and oxygen combine in the proportion of 1 part by weight of the former to 8 parts by weight of the latter; or, what is the same, they combine entirely when the volume of hydrogen is twice as great as the volume of oxygen (oxygen is 16 times as heavy as hydrogen). If, instead of these relative quantities, we should mix, say, 1 part by weight of hydrogen with 9 parts of oxygen, we should still find that only 8 parts of the latter have combined with all of the hydrogen into water, and that 1 part of oxygen has remained uncombined; the case would be analogous if, instead of an excess of oxygen, we employed an excess of hydrogen. Hence the conception of "combining quantities." Early in the nineteenth century Gay-Lussac discovered a remarkable fact, viz., that the relative combining volumes of gases can in all cases be expressed in the form of simple arithmetical ratios. We have just seen that hydrogen and oxygen combine in the ratio of 2 volumes of the former to 1 of the latter (the product is 2 volumes of water). In the case of the reacting pair, hydrogen and chlorine, the ratio is still simpler, 1 volume of hydrogen combining with 1 volume of chlorine (the product is 2 volumes of hydrochloric acid). It was this general fact that suggested to Avogadro his celebrated hypothesis, in accordance with which we explain the fact that 2 volumes of hydrogen react with 1 of oxygen, by saying that every 2 *molecules* of the former react with every 1 *molecule* of the latter.

Chemical Equations. The three principles just stated are expressed symbolically in those equations which chemists use to represent the various reactions of substances. Take, e.g., the equation representing the combustion of marsh gas, i.e., its combination with oxygen, viz.:

$$CH_4 + 2O_2 = CO_2 + 2H_2O.$$

The symbols CH_4, $2O_2$, CO_2, and $2H_2O$ represent, respectively, certain relative weights of marsh gas, oxygen, carbonic acid, and water; and the sign of equality denotes that the total mass of the carbonic acid and water yielded is precisely the same as the total mass of the marsh gas and oxygen that have disappeared as such. Similarly, the fact that the total number of C's, H's, and O's is respectively equal in the two members of the equation reminds us of the principle of conservation of the elements. Further, CH_4, O_2, CO_2, and H_2O represent equal volumes of the four substances, and hence the equation expresses that 2 volumes of oxygen are required to burn completely 1 volume of marsh gas, and that the products of the combustion are a volume of carbonic acid equal to that of the marsh gas burned and twice that volume of water vapor.

Reversible Reactions. In mathematics, the members of an equation can be transposed at pleasure, and $a = b$ may as well be written $b = a$. Not so in chemistry. A chemical equation represents not merely an equality of quantities, but an actual reaction of substances. And if, e.g., marsh gas and oxygen react to form carbonic acid and water, it does not by any means follow that carbonic acid and water will with equal readiness form marsh gas and oxygen, which would be expressed by the above equation if written in the form

$$CO_2 + 2H_2O = CH_4 + 2O_2.$$

There are, however, reactions that can actually be reversed. For instance, ordinary ethyl alcohol and acetic acid react to form ethyl-acetic ester and water. But ethyl-acetic ester and water also react to form ethyl alcohol and acetic acid. In this case we are, of course, justified in writing the equation in either of the following forms:

$$\underset{\text{Alcohol}}{C_2H_5OH} + \underset{\text{Acetic acid}}{CH_3CO_2H} = \underset{\text{Ester}}{CH_3CO_2C_2H_5} + \underset{\text{Water}}{H_2O}$$

$$\underset{\text{Ester}}{CH_3CO_2C_2H_5} + \underset{\text{Water}}{H_2O} = \underset{\text{Alcohol}}{C_2H_5OH} + \underset{\text{Acetic acid}}{CH_3CO_2H}$$

Reactions of this nature are termed *reversible reactions* and are now denoted by expressions in which the sign of equality is replaced by two arrows pointing in opposite directions. Thus, the reactions just mentioned would be represented as follows:

$$\underset{\text{Alcohol}}{C_2H_5OH} + \underset{\text{Acetic acid}}{CH_3CO_2H} \rightleftarrows \underset{\text{Ester}}{CH_3CO_2C_2H_5} + \underset{\text{Water}}{H_2O}$$

The investigation of reversible reactions has resulted in the establishment of the so-called law of mass action, which is at the basis of modern chemical statics and dynamics. In return the methods of chemical statics and dynamics have furnished positive proof that *all reactions are reversible*, i.e., that any reaction whatever may be set going backward, if only the proper physico-chemical conditions are established. In this manner, e.g., the decomposition of ammonia has been reversed, i.e., nitrogen and hydrogen gases have been caused to *form* ammonia, and thus a great new industry has been created under the guidance of the chemico-dynamic theory. See AMMONIA; REACTION.

Thermochemical Equations. Every given quantity of matter carries with it a certain quantity of energy. Heat being a form of energy, it is clear that the hotter the body the greater its energy. To cool it, we must abstract some of its heat by bringing it into contact with some cooler body; and then, by determining the rise of temperature in the latter, we can learn how much energy the hot body has lost. But while we can thus readily find out how much more energy a body contains at one temperature than at another, we have no way of telling how much energy it contains altogether, for we have no way of abstracting its energy entirely. Nevertheless, we know that different substances generally contain different amounts of energy, even if their temperatures are precisely the same. This is plainly shown by the fact that different substances have different "specific heats," i.e., that different amounts of heat are required to cause an equal rise of temperature in equal masses of them.

Now, since during chemical reactions the given substances disappear as such and new ones arise in their place, it is evident that chemical reactions must be accompanied by either evolution or absorption of heat. For, like the mass of matter, a quantity of energy can be neither destroyed nor created out of nothing, by a chemical or any other transformation. If the original reacting substances contain more energy than the products of the reaction, the reaction will cause some energy to be given off; thus, hydrogen gas and oxygen gas contain much more energy than the water vapor that may be formed from them, and hence their combination (the "burning") sets free much energy in the form of sensible heat. Precisely the same amount of energy would, on the contrary, be taken up if water were decomposed into its elements, hydrogen and oxygen. Reactions in which energy is

given off are called *exothermal reactions;* those in which energy is taken up are called *endothermal reactions.* It must not be thought, however, that transfers of energy are involved in chemical reactions alone. Thus, the evaporation of water is a purely physical transformation, and yet it involves the absorption of much heat. For this reason, if a chemist wishes to ascertain how much energy has been given off or taken up in a given chemical reaction, he must make a thorough study of the physical changes accompanying the reaction and of the transfers of energy caused by those changes. In this respect the most important form of physical change is the dissolution of solids in liquids, especially in water, because many important reactions take place in aqueous solutions.

The above considerations make it evident that the chemical equations discussed in preceding paragraphs are really incomplete; for they represent transformations of matter without stating what changes of energy accompany them. Whenever, therefore, questions of energy are of moment, whether in theoretical discussions or in problems dealing with foods, fuels, etc., chemists use a more complete form of equations, viz., "thermochemical equations." In writing these, Ostwald has adopted the following notation: Gases are denoted by their chemical formulas inclosed in parentheses; solids by their formulas inclosed in brackets; liquids simply by their formulas; substances dissolved in a great deal of water by the symbol Aq (i.e., *aqua*, water) affixed to their chemical formulas. Thus, (H_2O) denotes water vapor; $[H_2O]$ denotes ice; H_2O denotes liquid water; KClAq denotes potassium chloride in very dilute aqueous solution. Ostwald also proposes to denote the energy taken up or given off during reactions in terms of *kilojoules*, denoted by the symbol J. One kilojoule (= 10,000,000,000 ergs) is the same as 239.1 calories, a calorie being here the amount of heat required to raise by 1° C. the temperature of one gram of water of 18° C. For example, the neutralization of hydrochloric acid by potash in dilute solution, which is ordinarily represented by the equation

$$HCl + KOH = KCl + H_2O,$$

would be denoted thermochemically in the following form:

$$HClAq + KOHAq = KClAq + 57.3J.$$

The number of kilojoules represents the total amount of energy given off or taken up in the reaction. It is, however, important to observe that even the thermochemical equation does not give complete expression to all the important facts connected with the given reaction. Even leaving out of view questions concerning the atomic mechanism of the reaction and the catalytic influences involved in it (see CATALYSIS); the thermochemical equation fails to tell us how much *mechanical work* the reaction is capable of furnishing. The practical importance of knowing this need not be emphasized. But it should be remembered that this work is by no means equivalent to the heat given off. In fact, work can be furnished by a reaction even if, instead of cooling, it *absorbs* heat. See REACTION.

HISTORY

Ancient History. The history of ancient philosophy records certain theories of matter which have had a directing influence on chemical thought during later centuries. The most important ideas date from the fifth century B.C. Empedocles (c.490–430 B.C.), who may have derived his views from the ancient philosophers of the East, held that air, water, earth, and fire are four elements unrelated to one another and forming the basis of the universe. Aristotle (384–322 B.C.) added a fifth element, *ousia* (*οὐσία*), a purely spiritual substance pervading the infinity of space. During the Middle Ages not a little energy was lost in researches after this "fifth essence," which, by confusion of ideas, came to be regarded as a fifth elementary form of matter. To Aristotle the material elements were not altogether different from one another, but were forms of a primary substance differentiated by properties—as dry, moist, hot, cold—that were not essential to its nature. Hence, later, the alchemists' attempts to turn metals into one another, crowned by the belief that such transmutations cannot be effected by any known means. The atomic conception dates from Democritus (c.460–370 B.C.), who held that all bodies are made up of the atoms of one and the same substance, and that the differences exhibited by the various forms of matter are due entirely to differences in the size and shape of their atoms. It is hardly necessary to state that if this undeveloped idea of Democritus had not furnished a suggestion that led to the building up of a useful chemical doctrine, it would deserve no mention in the history of science. It is thus clear that the ancients did nothing directly towards the building up of a science of chemistry. Indeed, how much chemical knowledge can we expect to find in an age when a man like Aristotle did not hesitate to assert that a vessel will hold as much water if filled with ashes as when empty?

But while the intellectuals of the epoch were devoted to speculation concerning broad general questions of the philosophy of nature—with little result—artisans and craftsmen, priests and healers, gradually accumulated an empirical store of knowledge that was destined to serve as a crude foundation for a rational science of chemistry to be built up by experimenting philosophers in a remote future. Most of that empirical chemical knowledge was gained by the Egyptians and was by them communicated to the Jews and Phœnicians and later to the Greeks and Romans. The metallurgy of gold, silver, copper, iron, lead, tin, mercury, and perhaps zinc, and the preparation of certain alloys, were known at quite an early date. The Egyptians had highly developed the art of making glass and of coloring it by means of certain metallic oxides, and many extant specimens of Egyptian pottery are beautifully enameled in various colors. The art of dyeing fabrics with the aid of mordants had likewise been developed at an early date, and many mineral and organic coloring matters were known to the Egyptians, Phœnicians, and Jews. The Egyptians were also probably the first to employ substances for medicinal purposes.

Alchemy. Egypt was the birthplace of alchemy, the pretended art of making gold from base metals. Based on superficial observation and the erroneous interpretation of phenomena, this pseudo-art subsequently absorbed the attention of men for many centuries (see ALCHEMY) and rendered scientific progress, and hence the development of the useful arts,

impossible. Thus, the arts of metallurgy and of dyeing remained through the Middle Ages practically what they had been in Egypt long before the beginning of our era. Nevertheless, in their fantastic search after the philosopher's stone, the alchemists discovered methods of preparing many new substances, perfected many processes of manipulation, and thus slowly paved the way for the future investigator. Bismuth and antimony, sulphuric, hydrochloric, and nitric acids, the chloride and the carbonate of ammonium, the nitrates of potassium and silver, compounds of mercury, antimony, and arsenic—these and many other important substances were first prepared and their properties were first studied by the alchemists. Of course, the interpretation of known facts was absurd, based as it often was on the most groundless assumptions, e.g., the assumption that most substances and certainly all metals contain sulphur. As to the compounds of carbon, the alchemists did hardly anything towards laying a foundation for future organic chemistry, although they learned to concentrate aqueous acetic acid by distillation and to prepare a few metallic acetates and were familiar with certain reactions, such as the transformation of ordinary alcohol under the influence of sulphuric acid, the formation of certain esters, etc. A number of substances derived from the organic world were also used for medicinal purposes; but it was not until the beginning of the "iatrochemical" period that the art of preparing substances began to be looked upon as a handmaid of medicine. Alchemy proper had only one great object in view—to ennoble the base metals and to prolong life indefinitely—and this remained the principal aim of some of the best men even to the close of the era of iatrochemistry. The history of chemistry teaches here a remarkable lesson. Even in our own day the practical man is given to jeering at the uselessness of pure science; his attitude towards the activities of a scientific investigator is not unlike that of a busy adult towards a child's play. But the history of chemistry tells that while sixteen centuries of utilitarian search for gold and perpetual youth —the most utilitarian search imaginable— yielded nothing useful, the birth and activities in our own time of a pure, non-utilitarian science of chemistry have brought mankind incalculable wealth.

Iatrochemistry (Gk. *larpós, iatros,* physician). The first great iatrochemist was Paracelsus (1493–1541), who taught that the aim of chemistry was the preparation, not of gold, but of therapeutic agents. Adopting a view current among alchemists prior to his time, he held that, everything being composed of sulphur, mercury, and salt, if the amount of any of these happens to rise above or fall below the normal in the animal body, the result is a condition of disease. Hence disease must be combated by chemical means. Paracelsus therefore devoted himself to pharmacy and medical chemistry and soon became famous through the many happy cures that he actually succeeded in effecting. Unfortunately the adventurous life that he led, and his gross lack of modesty, aroused suspicion in many, and the bitterest opposition among the more conservative members of the medical profession, obscured his fame, and greatly diminished the sphere of his influence. Nevertheless, his great work was accomplished; pure alchemy had received at his hands the first powerful blow, pharmacy had been firmly linked to chemical science, and medicine had been aroused from the torpor of many centuries.

Following in the steps of Paracelsus came Turquet de Mayerne (1573–1655), Andreas Libavius (?–1616), Oswald Croll, Adrian van Mynsicht, and the great Van Helmont (1577–1644). Van Helmont not only realized that the processes of life, in health and disease, are largely dependent upon chemical changes, but he abandoned the arbitrary assumptions of Paracelsus concerning the chemical basis of the animal body, and his keen experimental researches imparted a powerful impulse to the development of scientific medicine. Equally, if not more, important was his recognition of the fact that there may be other gases than air, and that atmospheric air, carbonic acid, hydrogen, marsh gas, and sulphurous acid may be quite different from one another. In certain special cases he also succeeded in showing that substances are not lost, either qualitatively or quantitatively, when they enter into chemical combination, and that they may be reobtained entirely from the resulting compounds. Yet he believed in the possibility of making gold, and among the absurdities found in his writings is the assertion—strange to relate—that mice may be spontaneously produced in buckets filled with soiled linen and wheat flour! But if the spirit of the time permitted such beliefs, so much more wonderful must appear the scientific penetration of his genius, so much more deserved is his place among the best names of both chemistry and medicine. Other important names in connection with iatrochemistry are those of Sylvius (1614–72) and Tachenius. Sylvius was the first to grasp the similarity between the processes of respiration and combustion, and, recognizing the distinction between arterial and venous blood, he understood that the bright color of the former was due to the action of air. Digestion, too, he considered as a purely chemical process. His pupil, Tachenius, was the first clearly to recognize that salts are substances formed by the union of acids and bases; he studied the composition and properties of many substances, invented a number of interesting qualitative tests, and even subjected a few reactions to quantitative investigation, determining, e.g., the gain of weight involved in the oxidation of lead.

The age of iatrochemistry marks a great period in chemical history. During this period, for the first time, we find many thoughtful men making an endeavor to free themselves from the preconceived ideas of the past and to approach nature in a critical spirit and with a curiosity purely scientific. With iatrochemistry was thus born the possibility of chemical progress. But this is not the only thing for which mankind is indebted to that period. For, while the iatrochemists were preparing the first material for the very foundation of future chemistry, others were busy developing industries which have since become affiliated to our science. Foremost among these men were Agricola, Palissy, and Glauber. Georg Agricola (1490–1555) rendered great services to mining and metallurgy, introducing rational scientific methods into the former and perfecting many of the processes of the latter. His splendid treatise on metallurgy, in which these processes were described for the first time, long remained the standard work on its subject. Besides, he introduced a

practical system for the classification of minerals, based on their physical properties, such as color, hardness, etc. Bernard Palissy (c.1510–89), considering worthless and ridiculous the efforts of alchemy, devoted himself to experimental research in ceramic art and invented a number of valuable methods of coloring and enameling articles of pottery. Johann Rudolf Glauber (1604–68) improved many processes of dyeing and prepared a number of useful salts, including sodium sulphate ("Glauber's salt"), the chlorides of zinc, tin, arsenic, copper, lead, and iron, the nitrate of ammonium, tartar emetic, etc. He even succeeded in gaining some insight into the rationale of certain processes; but this did not prevent him from adhering to the most fantastic absurdities of alchemy to the very end of his life. In connection with the iatrochemical period reference must finally be made to the wonderful development of the art of making articles of glass, and to the rapid progress of the liquor industry, which had only been founded towards the end of the fifteenth century, i.e., a short time before the commencement of the period. As to scientific pharmacy, we have already stated that its beginning coincides with that of iatrochemistry, and it is hardly necessary to add that the latter enriched it with many new preparations and with a knowledge of the medicinal properties of substances already known.

About the middle of the seventeenth century iatrochemistry came to a sudden decline. That this had to happen sooner or later is clear, if we consider that a true medical chemistry could not possibly flourish before, on the one hand, chemistry itself was placed on a sound basis, and before, on the other hand, anatomy and physiology had attained a stage of serious development. The iatrochemists were still too utilitarian to accomplish much of really permanent practical value; even they had misdirected their efforts, and if we should in our present structure of chemistry mark the parts established by them, we would find that their lasting contributions were very few. The historical importance of the period is chiefly in the fact that with it came a revolution against traditional errors and a change in the direction of research.

The Forerunners of Chemistry. In the seventeenth century we find the Englishman Robert Boyle (1627–91) grasping truth with an insight unprecedented and in many respects not yet surpassed. Boyle understood that chemistry must be treated as an independent science, i.e., primarily without reference to applications of any sort, and that only in this manner could the relationships between chemical phenomena proper be discovered. He maintained that chemists should consider as an element only a substance which, in spite of exhaustive actual efforts, they have not succeeded in decomposing. And even this method, though necessary and sufficient for the purposes of science, he did not regard as proving the elementary nature of a substance absolutely beyond doubt. Still, he was inclined to consider the metals as elements, and, proving experimentally that the products of the destructive distillation of wood are compound, he refuted the opinion—then generally prevalent—that dry distillation breaks up substances into their elements. He further defined the distinction between a chemical compound and a mixture; the properties of a chemical compound, he maintained, are quite different from those of its components, while in a mixture each constituent retains its characteristic properties practically unaffected. Above all, he earnestly warned chemists against adopting hypotheses and general theories a priori. Theories are necessary; but unless they are generalizations cautiously made from observed facts, they may be dangerously misleading.

Boyle's views are now accepted universally. Had he grasped and succeeded in spreading abroad one more idea—viz., the absolute necessity of quantitative investigation—he would have doubtless become the founder of the science of chemistry—that is to say, with him would have commenced the epoch enlightened by truth and free from fundamental errors. This he did not accomplish; nor was it possible to accomplish it before the characteristics of gaseous matter came to be known better than they were in his day. And so it came about that chemists failed to appreciate his great warning against hypotheses that are not rigidly correlated with facts, adopted a belief in a fiery "phlogiston," and thus created a new period of darkness that lasted a century. It must be remembered that the important phenomena of what we now call oxidation engaged the attention of chemists towards the end of the seventeenth century and through the entire eighteenth century. These phenomena were explained by the supposed existence of phlogiston, a substance which may have been originally produced in the erring mind of some alchemist, but the first clear reference to which, under the name of *terra pinguis*, we find in the works of Becher (1635–82). Stahl (1660–1734) named it phlogiston, endowed it with certain imaginary properties, and used it as the basis of a doctrine which was soon accepted throughout the civilized world.

To give a clear and precise account of this, as of any other erroneous doctrine, is a matter of considerable difficulty. For when ingenious men are dominated by error, they will mold it into a variety of forms in their efforts to give it the appearance of truth and render it consistent with itself. The phlogistians handled their hypothesis with much dexterity. Yet their thought, lacking the character of quantitative precision, was weak; for quantitative conceptions, while already mastered by the physicist, were still in a state of confusion in the mind of the chemist. Distinguishing clearly between the absolute weight of bodies and their specific gravity, we have no difficulty in understanding that although water vapor is lighter than air, its addition to a given body must increase the weight of the latter, because water, whether liquid or vaporized, has weight. Stahl believed that the conversion of a "calx," i.e., a metallic oxide, into metal was caused by the addition of phlogiston. He *knew* that the conversion was accompanied by a diminution of weight; but from this fact he only deduced that phlogiston must be "lighter than air," failing to grasp that such an addition may make a body *lighter* in the sense of producing a system of lower specific gravity, but must necessarily make it *heavier* in the sense of increasing its absolute weight. It is more probable, however, that Stahl understood this in a general way, but thought that the metals had a lower specific gravity than their calces. At least Juncker, a pupil of Stahl's, asserts this about metals and calces as a matter of fact, although Boyle

had long before shown experimentally that the specific gravity of metals is really higher than that of their calces. Much more extraordinary is the conception that we find in the writings of Guyton de Morveau, Macquer, and others, who taught that phlogiston had *less than no weight!* Stahl conceived of phlogiston as a fiery principle, "*materia aut principium ignis, non ipse ignis.*" Seeing that charcoal burns up completely and is capable of producing metals by adding itself, as he thought, to their calces, he considered charcoal as made up almost entirely of phlogiston. Cavendish, knowing that "inflammable air" is given off when metals are dissolved in acids, adopted the view that that inflammable air (hydrogen) was phlogiston, with which metals part on coming into contact with acids. An inconvenient fact in connection with the phlogistic theory was that combustion, including the transformation of metals into calces, could only take place in the air. Stahl and his followers referred to this fact as if it were quite natural that if phlogiston was to be absorbed from metals there must be a medium capable of absorbing it. There were thoughtful men, however, who would not be satisfied with explanations of this kind. Boerhaave, whose *Elementa Chemiæ* (1732) served for many years as the standard textbook of chemistry, taught distinctly that the conversion of metals into calces involved the absorption of something from the air. This he deduced by combining the fact that the presence of air was necessary with the fact that the conversion involved increase in weight. The latter fact he even freed from an erroneous explanation attached to it by Boyle, who had thought that the increase in weight was due to absorption of heat during calcination; by the use of the balance Boerhaave showed that metals have precisely the same weight when glowing hot as when cold, and thus proved that heat has no weight. So near the truth were some. Yet none rose to combat the phlogistic theory, and all, even Boerhaave, were dominated by it more or less.

Two things were necessary to make away with phlogiston: first, a clear knowledge of some of the ordinary gases; secondly, a clear quantitative knowledge of some of the ordinary chemical transformations. The gases in question are carbonic acid, oxygen, and air. As to quantitative chemical knowledge, it can, of course, be acquired only by the use of the balance. Carbonic acid was known since the time of Van Helmont; yet chemists were not sure but that it might be impure air, until Joseph Black isolated it and demonstrated its properties in 1755. Bergman completed the study of this gas in 1774. The presence and properties of oxygen were suspected by Boyle, Mayow (1669), Boerhaave, and others; but it was first actually isolated by Priestley and Scheele in 1774. The nitrogen of the air was isolated by Rutherford in 1772. It must be remarked here that the apparatus and manipulations of "pneumatic chemistry" were gradually perfected by Boyle, Hales, Moitrel d'Element, Black, and Priestley, the latter having invented the method of collecting gases over mercury, which rendered possible the isolation of gases that are soluble in water. But the precise demonstration of the composition of gases, the introduction of the systematic use of the balance, are due to the founder of quantitative chemistry—the French physicist and chemist Lavoisier.

But before we proceed to narrate the further progress of chemical philosophy, it remains to enumerate briefly the most important achievements of chemical technology during the reign of phlogiston. In spite of its fundamental error, chemistry was making fairly rapid progress, and this naturally told on the industries. Boyle and Kunkel improved many metallurgical processes and the manufacture of glass. The manufacture of iron and steel owed valuable improvements to the researches of Bergman, Gahn, Rinman, and Réaumur. Stahl, Scheele, Hellot, Macquer, and others introduced new dyestuffs and improved many processes of dyeing. The preparation of zinc was improved by Marggraff, and its manufacture on a large scale was commenced at Bristol in 1743. The manufacture of sulphuric acid was commenced by Ward at Richmond; and in 1746 lead chambers were first introduced by Roebuck. In 1747 Marggraff discovered sugar in beets; however, the sugar industry was not born until the beginning of the nineteenth century. Early in the eighteenth century (1703) Böttger was accidentally led to the invention of porcelain, and its manufacture commenced at Meissen in 1710; but the processes were kept secret, and the manufacture was confined to Meissen until Réaumur rediscovered them by systematic research, and finally, in 1769, great porcelain works were established also at Sèvres, near Paris. In the course of the period many substances were introduced as therapeutic agents, and Scheele discovered a number of important compounds of carbon.

Modern Chemistry. If, after we have become accustomed to think of modern chemistry as founded in the latter part of the eighteenth century, we take up the writings of phlogistic chemists prior to that time, we may be greatly surprised to find that our general principles were not at all unknown to them. They certainly believed in the indestructibility of matter, and some of them described molecules and atoms in much the same way as we describe them at the present day. And yet their knowledge cannot be rightly considered as constituting a science. Their abstract speculations were very keen; their knowledge of chemical facts was quite extensive; but that mathematical correspondence between abstract principles and concrete phenomena which alone constitutes science did not exist. And so, even when the properties of gases were no longer unknown, all chemical knowledge remained in a state of confusion, and elements continued to be considered as compounds, compounds as elements, combinations as decompositions, and decompositions as combinations, until the work of establishing the scientific correspondence was begun by Lavoisier.

Endowed by nature with a keenly critical mind, Lavoisier acquired the habit of quantitative thinking by early training in mathematics and physics, and by subsequent association with some of the most brilliant mathematicians and physicists of his time. As early as 1770 we find him solving a problem of chemistry by a purely quantitative method. It was known, viz., that when water is kept boiling for some time in a glass vessel, there is formed in it an earthy deposit; it was therefore believed that water could be converted into "earth." Lavoisier heated water in a glass vessel, weighed the vessel before and after the operation, and found that the vessel *plus* the deposit after the opera-

tion weighed exactly as much as the vessel alone weighed before. He thus proved that the earthy deposit came, not from the water, but from the glass of the vessel. In 1772 he turned the same quantitative method of experimenting and reasoning to the conversion of metals into calces, and in 1774 published the following observation: When metallic tin is heated in a sealed retort full of air, it becomes transformed into its calx; the weight of the sealed retort with its contents is exactly the same after the reaction as before; if the retort is now opened, air rushes into it and the weight is increased; the increase is equal to the difference in weight between the calx formed and the mass of metallic tin employed. From this Lavoisier concluded that the transformation of tin into its calx involved the absorption of air, and that phlogiston had nothing to do with the phenomenon. It also became evident to him that the balance of precision could serve the chemist no less than the telescope served the astronomer, and that the principle of indestructibility, which could and should be established experimentally, ought to be at the basis of all chemical reasoning. When Priestley and Scheele discovered oxygen, they thought that it was this constituent of air that was capable of absorbing phlogiston from metals; Lavoisier demonstrated that it was this constituent of air that combined with metals to form calces. He recognized that the same gas combined with sulphur, phosphorus, charcoal, and other combustible substances, and as he regarded the resulting compounds as acids, he gave to the gas the name *oxygen* (from the Greek ὀξύς, *oxys*, acid, and γενής, *genēs*, producing), and adopted the view that it was an indispensable constituent of all acids (this view was discarded half a century later). Carbonic acid he recognized as a compound of carbon and oxygen, and when Cavendish found that the sole product of the combustion of hydrogen in oxygen was water, Lavoisier understood that water was not an element, but a compound of hydrogen and oxygen, and had no difficulty in determining its quantitative composition. Carbonic acid and water he also showed to be the products of the combustion of organic substances, and soon he recognized that respiration, too, was a process of organic combustion.

Logical and consistent as Lavoisier's method appears to the unprejudiced mind, it failed to appeal to some of the most eminent men of his time. Thoroughly accustomed to the inverted principles of the phlogistic doctrine, those men adhered to them as firmly as fanatics will adhere to an absurd creed, and some of them, including Priestley, himself the discoverer of oxygen, died believers in phlogiston. Nevertheless, Lavoisier lived to see the light of his system spread over the entire scientific world and turn chaos into order. He had established a rigid correspondence between the law of indestructibility and chemical transformations and had thus built the first bridge between an abstract principle and the world of chemical phenomena. The concept *element* was now correctly applied to oxygen, hydrogen, carbon, sulphur, phosphorus, and the metals then known in the free state; the concept *compound* was correctly applied to water and the oxides of the metals. True enough, in his list of elements (1787) Lavoisier included also light and heat and the compounds potash, soda, and lime; on the other hand, he considered the element chlorine as a compound containing oxygen. But this did not interfere with further progress. The first bridge of chemistry was firmly established, and the lingering errors were rectified (mainly by Sir Humphry Davy) early in the nineteenth century. The development of another correspondence—viz., that between the hypothesis of the atomic constitution of matter and the quantitative composition of substances—was already noted in a preceding section of this article. Here it may be observed that the law of multiple proportions was first discovered by Richter (1762–1807), and that Proust (1754–1826) continued Richter's researches and clearly demonstrated the law in course of a controversy with Berthollet. Dalton (1804) rediscovered the law dèductively and then proved it experimentally; he was thus the first to establish a rational connection between the old atomic hypothesis and the facts of chemical composition.

After the relation between the known metals and their oxides was established, Lavoisier himself, and others, began to suspect the true nature even of oxides whose metals were not yet known in the free state, and attempts began to be made to decompose these oxides so as to isolate their metallic elements. About the beginning of the nineteenth century Sir Humphry Davy (1778–1829) undertook to investigate the effect of the galvanic current on chemical compounds. In 1807–08 he succeeded in decomposing caustic potash and caustic soda, obtaining from them the metals potassium and sodium. About the same time Seebeck similarly decomposed the oxides of calcium, barium, strontium, and magnesium, obtaining these metals in the form of their amalgams, i.e., combinations with mercury. From these amalgams Davy isolated the metals themselves and gave them their present names. From the metals Davy turned his genius to the nonmetallic elements. Chlorine, known since 1774, remained unrecognized as an element and was generally considered as the oxide of hydrochloric acid. In 1811 Davy clearly demonstrated its elementary nature; and when, soon afterward, Courtois discovered iodine, Davy showed that this substance, too, so similar to chlorine, must be considered as an element. Davy also was the first to demonstrate clearly the elementary nature of nitrogen and even of fluorine (from the similarity of hydrofluoric to hydrochloric acid, and of the fluorides to the chlorides), although the latter element was not yet known in the free state and remained unknown until 1887. The value of Davy's contributions can be readily appreciated if we remember that the substances he was dealing with are among the commonest in the entire range of chemistry, and if we imagine how much confusion would suddenly ensue in all departments of the science if we were to forget their existence or their true nature.

Dualism. On the basis of his electrolytic investigations, Davy also constructed an electrochemical theory which was subsequently modified and extended by Berzelius. According to Davy (1807), when the atoms of different elements come into contact, they become charged with the opposite forms of electricity, by whose attractive force they are held together, constituting chemical compounds. Berzelius' theory was as follows: The atom of each element does not *become* charged with electricity on coming in contact with other atoms, but *is* charged, whether combined with other atoms or not.

With respect to the electrical charges of their atoms, the elements form an "electro-chemical order," oxygen being the most electro-negative, potassium the most electro-positive, and hydrogen dividing the electro-negative from the electro-positive elements. All bases are produced by the combination of oxygen with electro-positive, all acids by the combination of oxygen with electro-negative elements. Yet bases and acids are not altogether neutral; in the former positive electricity, in the latter negative electricity, predominates. This is why bases and acids show no mutual chemical indifference, but combine to form salts. When the terminals of a sufficiently powerful galvanic battery are immersed in the solution of a salt, the base of the latter is attracted more strongly by the negative terminal than by the acid, and the acid is attracted more strongly by the positive terminal than by the base; hence electrolysis ensues, the base being deposited on the negative, the acid on the positive, terminal. In brief, Berzelius maintained (1) that oxygen is an indispensable constituent of bases, acids, and salts; (2) that bases, acids, and salts have a dual constitution, each being made up of an electro-positive and an electro-negative part; (3) that chemical affinity is nothing but the mutual attraction of opposite forms of electricity. In the first of these principles Berzelius followed Lavoisier, for years refusing to accept Davy's view that chlorine and nitrogen were elements, and that their compounds with hydrogen, viz., hydrochloric acid and ammonia, although respectively an acid and a base, contained no oxygen. The structure of the entire theory became somewhat shaky when the correctness of Davy's views was finally recognized by all, including Berzelius himself (1820). Nevertheless, Berzelius, and with him the entire chemical world, continued to adhere to the electro-chemical theory, and thus a strictly dualistic conception of compounds continued to reign in the science. The thirties, however, brought much new evidence against Berzelius' principles. First of all it was recognized that electrolysis breaks up a salt, primarily not into two oxides, but into a free metal and an acid radicle. For example, potassium sulphate is broken up, primarily not into K_2O and SO_3, but into K_2 and the radicle SO_4. This made it evident that sulphuric acid was not SO_3, but H_2SO_4 (i.e., SO_3 chemically combined with H_2O), because the SO_4 radicle was seen to be the true acidic component of potassium sulphate. Two important conclusions thus thrust themselves upon chemists: (1) an acid is not a binary compound of *oxygen* with an electro-negative element, but a combination of *hydrogen* with an electro-negative radicle; (2) a salt is not a compound of two oxides (e.g., $K_2O.SO_3$), but a combination of a metallic element with the electro-negative radicle (e.g., SO_4) of an acid. The first of these conclusions, together with Davy's discovery that hydrochloric acid contained hydrogen but no oxygen, indicated that not oxygen, but hydrogen, is an indispensable component of acids, and this view was further strengthened by Graham's and Liebig's classical studies of the so-called polybasic acids. But so profound was Berzelius' belief in dualism, and so great was his authority, that the electro-chemical theory still continued to stand, and the conclusions just pointed out were not generally accepted for some years. The final blow to dualism came from the young organic chemistry, in which the electric theory had been applied as generally as in the inorganic branch of the science. About the middle of the thirties Laurent and Dumas made a series of important discoveries showing that chlorine and other elements could be substituted for the hydrogen of organic compounds, and that the nature of the latter was thereby affected very little. But if part of the molecule of a compound can combine with either of such electrically different atoms as those of hydrogen and of chlorine, then there is no reason for believing that that part is essentially either electro-positive or electro-negative, and hence there is no reason for believing that every compound is made up of two electrically opposite parts. The more evidence to this effect was brought forward, the more bitterly old Berzelius adhered to the electro-chemical theory. But finally it became evident to all that, as Liebig wrote, "the wheel of time cannot stand still," and "Berzelius is fighting for a lost cause"; and thus, towards the end of the thirties, electro-chemical dualism was overthrown. As a result of their struggle against dualism, chemists then fell into the opposite extreme and adopted a purely unitary view of chemical combination. The molecule of a compound was conceived to be a composite unit somewhat like the solar system, in which the planets are held together by mutual attraction, but which does not by any means consist of two essentially different parts, endowed with two opposite forms of energy. Such unitary views of combination are still prevalent in chemistry to-day. But "the wheel of time cannot stand still," and recent years have forced upon us theories which make us feel that extreme unitarism is just as inadequate as extreme dualism. The elements certainly differ in their electrical properties, and chemists have even succeeded now in expressing those differences mathematically. Electricity, while not identical with the energy that causes the mutual attraction of atoms, is yet certainly one of the factors determining that attraction. At present, however, it is impossible to tell what compromise between chemical unitarism and electro-chemical dualism will ultimately be adopted.

Organic Chemistry. When the general principles of chemistry were established, and the atomic hypothesis had lent to the science a keen power of penetration, it became possible to approach the world of organic matter with the hope of shedding some light upon its mystery. Since then organic research occupied chemists almost exclusively during a greater part of the nineteenth century, and the result of that inquiry has been not only a vast store of empirical knowledge of organic compounds, but also a set of general principles that have strengthened the theoretical basis of the science and have led to some of the great industrial achievements of modern times.

Early in the nineteenth century it was universally believed that organic substances could not be produced without the agency of the "force of life." Whether there is such a distinct "force," and what its relations may be to the measurable forms of energy, we do not know as yet. But we do know that organic compounds can also be produced by chemical agencies alone, without the intervention of anything else. For chemists have actually succeeded in building up from their elements many

thousands of compounds that occur ready formed only in the organisms of animals and plants. The first of such compounds reproduced in the laboratory was urea, which Wöhler made artificially in 1828. The old belief, however, lingered, some chemists contending that urea could not be looked upon as a true organic compound. Gradually, however, less doubtful organic compounds were reproduced synthetically. Writing in 1839 of the synthesis of formic acid, Ure says: "The artificial formation of this animal secretion is one of the most remarkable triumphs of modern chemistry." When Kolbe synthesized acetic acid in 1845, and when other indisputably organic compounds were made from their elements, then all agreed that there was no essential difference between organic and inorganic compounds, and that the former were nothing but the compounds of carbon. At present many dyestuffs, drugs, and perfumes, which could once be obtained only from plants, are made artificially on a large scale, and so are many valuable carbon compounds that are not known to occur ready formed at all.

While the belief in an indispensable force of life thus delayed for a time the progress of synthesis, chemists early directed their attention to the problem of molecular constitution. Berzelius was led to this problem by his electrochemical theory. But in the twenties facts became known which made its study an imperative necessity also from a purely practical standpoint. Not small was the surprise of chemists when Gay-Lussac and Liebig found, in 1823, that silver fulminate had precisely the same composition as silver cyanate. Two years later, Faraday discovered a volatile liquid hydrocarbon that had precisely the same composition as ethylene gas. Berzelius first thought it unwise to abolish, on the evidence of a few facts, what had seemed an axiom, viz., that two different compounds cannot possibly have the same composition. But when he discovered that racemic and tartaric acids, too, had the same composition, he realized that the character of a substance must depend not only on its *composition*, but also on its *constitution*, i.e., not only on the kind and number, but also on the arrangement of the atoms in its molecule. Thus was born that great problem of modern chemistry—to determine the constitution of substances from the standpoint of the atomic hypothesis.

In 1832 Liebig and Wöhler made an important discovery: A series of compounds allied to benzoic acid were transformed by them into one another, and through all the transformations a group of atoms (made up of carbon, hydrogen, and oxygen), which they named "the benzoyl radicle," remained unchanged; the molecules of benzoic acid, benzaldehyde, benzamide, and benzoyl chloride contained that radicle in common, as if it were a single atom of some element. The discovery of benzoyl was followed by Liebig's discovery of ethyl, a radicle common to ordinary alcohol and ether, and by Bunsen's discovery of cacodyl, which is possessed in common by several compounds of arsenic. The discovery of radicles was obviously the first step towards a knowledge of the constitution of compounds. But almost from the beginning the idea of radicles became associated with certain other ideas that could not be maintained in the light of more knowledge. Berzelius subdivided organic radicles, like the elements, into electro-positive and electro-negative. On the other hand, it was generally expected that radicles would eventually be isolated and thus constitute a series of simple compounds whose molecules would bear the same relation to the substances of organic chemistry as the atoms of the elements bear to the compounds of inorganic chemistry. But when the electro-chemical theory was overthrown, while attempts to isolate radicles remained fruitless, the opinion began to spread that the theory of radicles had made of organic chemistry a science of imaginary substances, and, hence, the sooner the theory was abolished the better for the young science. But how, then, were organic compounds to be correlated? A solution of this problem was suggested by Dumas in 1839. Continuing his researches on the substitution of different elements for one another in organic compounds, Dumas found that in acetic acid hydrogen could be exchanged for chlorine, and that the resulting compound (trichlor-acetic acid) was very much like acetic acid itself. Similar facts had already been observed, since 1834, by himself as well as by Laurent. It now occurred to Dumas that in correlating their substances chemists could be guided solely by the phenomena of substitution. Acetic acid and its chlorine-substitution product obviously belong to the same "type," and similar relations exist between other substances as well. If, therefore, the phenomena of substitution were investigated in connection with organic compounds in general, the result would be a grouping of compounds free from all hypothesis, but based on and exhibiting clearly their natural relationship. Such were, *in nuce*, Dumas's views, on the basis of which the celebrated "theory of types" was gradually built up in course of the fourth and fifth decades. The most important contributions to the theory were made by Gerhardt, Wurtz, Hofmann, and Williamson. Gerhardt realized that Dumas's ideas were worthy of being developed, but he also realized that this could not be done without the aid of the idea of radicles. No objection could be raised against the latter idea, once it were freed from all unnecessary associations, especially from the belief that radicles were unalterable substances capable of independent existence. To say that benzoyl chloride, C_7H_5OCl; benzoic acid, $C_7H_6O_2$; and benzamide, C_7H_7ON, contain in common the benzoyl radicle, i.e., the group of atoms C_7H_5O, was only to express what was evident from their formulas. On the other hand, the recognition of radicles must obviously lead to the discovery of the relationship of compounds, and thus, together with the phenomena of substitution, guide in grouping compounds in accordance with the idea of types. In 1849 Wurtz and Hofmann discovered a series of compounds that bore an unmistakable resemblance to ordinary ammonia, and could be considered as ammonia in which one or more hydrogen atoms were replaced by radicles. They proposed to group them together as belonging to the "ammonia type." In 1850 Williamson showed that alcohols, ethers, and acids could be referred to the "water type." Ordinary alcohol, e.g., whose formula is C_2H_6O, could be considered as water, H_2O, in which one hydrogen atom has been replaced by the ethyl radicle, C_2H_5. Ordinary ether, $C_4H_{10}O$, could be considered as water, H_2O, in which two hydrogen atoms have been replaced by two ethyl radicles, ether being thus $(C_2H_5)_2O$. Acetic acid,

$C_2H_4O_2$, could be considered as water, H_2O, in which one hydrogen atom has been replaced by the radicle C_2H_3O. Now, ether, $(C_2H_5)_2O$, was obtained from alcohol, C_2H_5HO, by the use of dehydrating agents. Williamson therefore held, by analogy, that it ought to be possible to transform acetic acid, $C_2H_3O.HO$, into a compound, $(C_2H_3O)_2O$. When, in 1852, Frankland actually succeeded in effecting this transformation by the use of dehydrating agents, the usefulness of the type theory was demonstrated. For nothing is more striking proof of the value of a theory than its capacity for revealing unknown facts. To the types *ammonia* and *water* Gerhardt added the types *hydrogen* and *hydrochloric acid*, and for a time it seemed that all organic compounds could be grouped under these four simple types. It was soon found necessary, however, to introduce the ideas of "condensed types," like the condensed water type, $(H_2O)_2$, "mixed types," and the type *marsh gas*, CH_4. In course of the fifties the type theory thus gradually became less and less simple, and hence less and less valuable for the purpose of correlating organic compounds.

Meanwhile an idea of inestimable value had thrust itself upon chemists. Inspecting the typical formulas of compounds, they could not help noticing that certain radicles (e.g., methyl, CH_3, or ethyl, C_2H_5) were capable of replacing each a single atom of hydrogen; others were capable of replacing each two atoms of hydrogen, etc. In other words, some radicles were seen to be equivalent to an atom of hydrogen; others had double its combining capacity, etc. Hence the idea of the *valency* of radicles and atoms. Like most other general ideas, that of valency was not new. In a vague and more or less specialized form it may be found in the researches of Berzelius, Graham, Liebig, and others; and Frankland, who first clearly enunciated it, in 1852, justly points out that it was probably a vague recognition of the valency of radicles, as exhibited by the facts of substitution, that gave birth to the theory of types. Frankland's statements, however, attracted no attention. In 1858 Kekulé and Couper independently developed the same idea, the latter proposing to symbolize the combining capacity of different atoms by the dashes now generally employed in graphic formulas. Kekulé called attention to the quadrivalence of the carbon atom, as shown directly by compounds like the following: CH_4, CH_3Cl, CH_2Cl_2, $ChCl_3$, CCl_4; or indirectly by such compounds as CO_2, $COCl_2$. In the former compounds a single atom of carbon is seen to be equivalent to four atoms of hydrogen, and a single chlorine atom to a single atom of hydrogen, which is also shown by the formula of hydrochloric acid, HCl. In a compound like $COCl_2$, the oxygen atom must therefore be assumed to be divalent, and so it is directly shown to be by the formula H_2O. Kekulé soon came to the conclusion that in practically all organic compounds one carbon atom is combined with a quantity of other elements which is equivalent to four atoms of hydrogen. This gave rise to a lively controversy, the critic Kolbe especially maintaining that the valency of an element may not be the same in all of its compounds. Kekulé's view, however, was finally accepted by all, and in 1860 chemists the world over were busy determining the "structure" of organic compounds—a problem which has since occupied the attention of a majority of them almost exclusively. The theory of types, the mother of the structural theory, exhibited the radicles of compounds, and thus explained those cases of isomerism in which compounds are different because they contain different radicles. Those further cases in which the radicles themselves are differently constituted, it could not explain. The doctrine of valency, showing the different ways in which the atoms can be linked in the radicles, has furnished a satisfactory solution of the problem of molecular constitution and has completely explained the fact that the molecules of different compounds may be made up of the same atoms. At first Kekulé scarcely appreciated the full value of his own ideas. In the very memoir in which he states the doctrine of valency, he advances the view that this doctrine cannot by any means solve the problem of the constitution of compounds; the old problem, he thought, might possibly be solved some day by physical chemistry. Perhaps he was not altogether wrong. For now, after half a century of experience, organic chemists are beginning to complain of the inadequacy of the structural theory, even with its more recent development—stereochemistry (q.v.)—and to look forward to some broader idea, that would correlate a larger number of known phenomena and permit of foreseeing a larger number of as yet unknown facts. What that idea will be, no one can tell as yet. Chemists are energetically trying to attain it by way of inquiries into the *nature* of valency, and an increasing number of such inquiries are now published every year. The conception of valency has lost much of its original rigidity, and the idea that carbon, e.g., is not necessarily quadrivalent, but may in certain compounds act as a trivalent or even as a bivalent element, is no longer astonishing to anybody. Thus, in fulminic acid carbon is very generally considered to be bivalent, and in triphenyl-methyl it is also generally admitted to be trivalent. Further, the existence of "additional valencies," "partial valencies," etc., is not infrequently assumed, for very practical purposes, by contemporary chemical investigators. See VALENCY.

General Chemistry. The doctrine of valency could not have come into existence if not for the fact that towards the end of the fifties chemists had learned the true atomic weights of the elements. Without a knowledge of the true relative weights of atoms, it would have been impossible to know their true number in molecules and, hence, impossible to know their true valencies. Atomic weights were determined, calculated, and recalculated ever since Dalton first established the atomic theory. Dalton himself, as stated in a previous section of this article, determined atomic weights on the basis of certain simple assumptions. Soon afterward Berzelius devoted himself to the problem with great assiduity. From the law of combining volumes, discovered by Gay-Lussac in 1808, Berzelius inferred that equal volumes of gaseous elements must contain equal numbers of particles. In 1819 Mitscherlich discovered the principle of isomorphism. (See ATOMIC WEIGHTS.) Berzelius had carried out about 2000 analyses, determining the relative quantities of the elements contained in a great variety of compounds. By combining the principle of isomorphism with that of equal gaseous volumes, he was now able to calculate the atomic weights of the elements. Now, his principle of equal volumes was not quite correct. To him the par-

ticles of a gaseous element in the uncombined state were isolated atoms. While he distinguished between the particles of compounds and the atoms of elements, he failed to distinguish between the free particles of elements and their atoms. That the particle of an element might be made up of two or more single atoms, it would have been impossible for him to admit; for, according to his electro-chemical theory, only unlike atoms could exist in combination with one another. Avogadro's memoir of 1811, in which more correct views on the subject had been advanced, therefore remained unnoticed, and Berzelius' atomic weights were for years employed by all. Nor were most of those figures wrong; for in many cases Berzelius' error eliminated itself, owing to the fact that the molecules of the ordinary gaseous elements are made up of equal numbers of atoms. Knowing the true atomic weights of the ordinary gaseous elements, Berzelius was able to obtain correct figures for many other elements, with the aid of the principle of isomorphism and certain other principles that need not be explained here. Thus, his figure for mercury was 200, that for phosphorus 31, that for sulphur 32—figures practically identical with those accepted at present. In 1827, however, Dumas invented his celebrated method of determining vapor densities and undertook to apply Berzelius' principle of equal volumes to elements which are not ordinarily gaseous. Finding that the vapor of mercury is 101 times as heavy as an equal volume of hydrogen, the vapor of phosphorus 62.8 times, and the vapor of sulphur 96 times, as heavy as hydrogen, Dumas concluded that the relative weights of their atoms must be, respectively, 101, 62.8, and 96, and not 200, 31, and 32, as Berzelius thought. The error of Berzelius' principle thus emerged in the results of Dumas. But instead of rectifying the error of his principle by introducing the concept of the *molecules* of elements, Berzelius only concluded that the principle was unreliable. The result was that chemists began to disagree as to the true values of the atomic weights, and many even abandoned the hope of ever knowing atomic weights altogether, and decided to use nothing but *equivalents*. These represented the weights of elements that were capable of combining with, or of being replaced by, unit weight of hydrogen. For example, Berzelius' view that an atom of oxygen was 16 times as heavy as an atom of hydrogen was abandoned, and as hydrogen combined with 8 times its weight of oxygen, the latter was represented by its equivalent 8. But the use of equivalents was not universal, many chemists using systems in which the figures were partly equivalents, partly atomic weights, and thus for years great confusion reigned in chemical notation, the true purpose of which is to avoid confusion by exhibiting the composition of substances in the simplest and clearest possible manner. In the forties Laurent and Gerhardt became convinced that the progress of knowledge in organic chemistry was seriously impeded by the lack of a consistent system of atomic weights. Their researches soon led them to distinguish clearly between the atoms and molecules of elements, and to grasp the full value of Avogadro's principle for determining the relative weights of molecules. With the aid of this principle Gerhardt found the true atomic weights of the elements; and in the latter part of the fifties his pupil Cannizzaro demonstrated clearly the consistency of the principle with all known facts. Thus was paved the way for the doctrine of valency. A few years later (in 1869) Mendeléeff and Lothar Meyer established a remarkable connection between the properties of the elements and their atomic weights (see PERIODIC LAW), and thus the correctness of the latter was confirmed in a very striking manner.

The further progress of general chemistry has been mainly in connection with the various subdivisions of physical chemistry, brief historical accounts of which may be found under REACTION; SOLUTION; DISSOCIATION; THERMOCHEMISTRY; ELECTROCHEMISTRY; CATALYSIS. (See also the article LABORATORY.) The epoch-making discovery of radium has resulted in the birth of what is really a new science—the science of radio-activity (q.v.), which has even already a history of its own.

LITERATURE

In a science whose progress is so phenomenally rapid as that of chemistry, even the best books are likely, within a few years of publication, to lose more or less of their original value. Nevertheless, it is safe to say that most of the following works will, in the ordinary course of events, retain their interest for a number of years to come. The list includes some of the best-known modern works on descriptive, theoretical, and technical chemistry. More specialized works are noted in the articles on various chemical topics.

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CHEMISTRY, Agricultural. The branch of chemical science which deals with the problems of the soil, the nutrition of plants and animals, the composition of their products, and their value as food for man and animals. Its field borders on those of vegetable and animal physiology on the one hand, and of physics and geology on the other; and in working out problems in agriculture, the agricultural chemist has frequently been led into these adjoining branches of science. His work has, however, been essentially chemical, and thus a quite distinct and well-defined branch of chemical science has been built up.

History. The first attempt to bring together in a systematic manner the teachings of chemistry as applied to agriculture was made by Sir Humphry Davy, in a series of lectures before the British Board of Agriculture, early in the nineteenth century (*Elements of Agricultural Chemistry*, 1814). Davy regarded the soil as the source of all nourishment of plants, and he announced the general principle that plant food must be practically dissolved before it can enter the organism of the plant. But while he and his predecessors knew the value of certain materials for plant food, they did not know the constituents which gave them this value. Oil, e.g., was long supposed to be one of the most valuable fertilizing constituents, and Davy supposed sugar to be also. One of the reasons for this error was undoubtedly the belief that the carbon of plants was derived through the roots from the humus—i.e., the partially decomposed organic matter of the soil. The errors of this "humus theory" were pointed out, about 1840, by Justus von Liebig, who in his generalizations drew heavily upon the works of De Saussure and Boussingault. Liebig showed the carbonic acid of the air to be the source from which plants

derive their carbon, and the leaves to be the medium through which this assimilation takes place. He thus laid down a fundamental principle of physiological botany. He established the interdependence of plants and animals with relation to carbonic acid, which is a vitalizing principle of the one and an excretory product of the other. In place of the "humus theory" he advanced his famous "mineral theory," according to which the soil furnishes to plants their ash or mineral constituents; and this led him to suggest the employment of artificial fertilizers for keeping up the supply of the mineral constituents of the soil and thus maintaining its fertility. Liebig's views, with some modifications, form the basis of our present theories; but, on the other hand, we have learned much regarding the true value of humus and its functions in the soil. See MANURES.

In the field of animal nutrition, or the utilization of plants and their products in feeding animals, agricultural chemistry has likewise led to the establishment of the underlying principles and the methods of research. The earlier ideas regarding the valuable food constituents of plants were equally as crude as those regarding the fertilizing constituents. There was a prevalent belief in a subtle, undefined property of forage plants, upon which their nutritive properties largely depended, and it was a long time before the connection between nutritive value and chemical composition was traced. Boussingault, in France, attempted to classify feeding stuffs on the basis of their nitrogenous constituents; and Thaer, in Germany, compared them with hay and prepared his tables of "hay values." At length Henneberg worked out a classification of the nutritive constituents of feeding stuffs, and a method of analysis known as the Weende method. His classification and method have been extensively employed, having served as the basis in most of the investigations since. These studies in animal nutrition have led the agricultural chemist into a field of inquiry intimately connected with physiology proper; and in the development of the theories, as well as in their application in practice, agricultural chemistry has until recently contributed much more than physiology itself and has usually been the leader. See FEEDING FARM ANIMALS.

Agricultural chemistry laid the foundation for a science of agriculture, and one of the most important and far-reaching influences of the early agricultural chemists was that which led to the establishment of the agricultural experiment station. The teaching of agriculture in agricultural schools and colleges preceded it in most countries, but the investigation and experimentation was for the most part in the hands of the agricultural chemists. Their work led them into agricultural experiments of various kinds, as a matter of necessity, and Liebig, Boussingault, Lawes and Gilbert, and others, laid out experimental fields for carrying on their studies and testing their theories. As the practice of fertilizing the soil became introduced in the Old World, farmers found themselves confronted by a variety of problems relating to their soils and fertilizing materials which they were unable to answer, and they quite naturally turned for advice and guidance to the agricultural chemists who had developed these theories. Thus experiment stations came to be established, first by agricultural societies of private individuals and later with government aid. (See AGRICULTURAL EXPERIMENT STATIONS.) In the United States the researches and writings of S. W. Johnson (*How Crops Grow*, 1869; *How Crops Feed*, 1870), C. A. Goessmann, E. W. Hilgard, G. C. Caldwell, W. O. Atwater, and other chemists, prepared the way for the establishment of experiment stations as State institutions; and out of these has grown a system of stations under government aid and supervision, embracing every State and Territory in the Union, and providing incidentally the most munificent endowment for agricultural-chemical research to be found in any country.

Agricultural Analysis. The chemical substances with which agricultural chemistry is primarily concerned are those comprising the ash, or mineral constituents, and the food constituents of plants. As the soil is the source of the mineral constituents of plants, and usually of the nitrogen also, those elements of the soil which serve as food for plants—i.e., which enter into their composition—are embraced in the field of agricultural chemistry; and, on the other hand, as farm animals derive their nourishment from plants, agricultural chemistry is naturally concerned with the food constituents of these plants. The plant is thus a link between the soil and the animal, as regards the mineral elements; but the plant gets its carbon from the air and develops from it a series of carbon-containing compounds, which in turn are the source of carbon to the animal.

In the analysis of the plant we find first that the tissue contains a very large percentage of water—up to 90 per cent—which is indispensable to its growth and circulatory system. This water is expelled by heating the plant in a drying oven at about 212° F. for several hours. The residue, or *dry matter*, consists of organic constituents and a relatively small proportion of ash. The former are combustible, and hence the ash is determined by burning the sample. The ash consists chiefly of lime, magnesia, potash, soda, iron, silica, chlorine, and carbonic, sulphuric, and phosphoric acids. In plant analysis determinations are made of all these constituents. In analyzing fertilizers, only the potash, phosphoric acid, and nitrogen are commonly considered, these three being often spoken of as the fertilizing constituents. Latterly lime and sulphur are often included, and in special cases the other ash constituents, soda, magnesia, iron, etc. In fertilizer analysis it is customary to carry out separate determinations of the phosphoric acid soluble in water (mono-calcium phosphate), of "reverted" phosphoric acid—i.e., that soluble in a standard solution of ammonium citrate (di-calcium phosphate), and of the insoluble form (tri-calcium phosphate). The soluble and reverted forms are more readily available to plants than the insoluble form and are valued at a higher price. In complete analysis of soils other mineral ingredients besides the potash and phosphoric acid are determined, such as magnesium, calcium, sodium, manganese, iron, alumina, and silica, and also the humus. The latter is a very important constituent of soil in determining its fertility, ability to retain moisture, and to support biological changes which render the soil constituents available to plants. Mechanical analysis of the soil is also made, in which the sample is separated into particles of different sizes by means of water, and the percentage of each grade ascertained. The value of an agricultural soil depends to a considerable

extent upon its mechanical condition, as shown by this analysis, since this largely governs its capacity for moisture, capillarity, suitability for certain crops, and other qualities. In the examination of soils there have been many attempts to estimate the amount of the fertilizing ingredients present in forms available to plants. This is done by extracting the soil with weak acids and analyzing the extract, or by growing plants in pots of the soil and analyzing the crop. Important as this matter is in determining the fertilizers needed by soils, no method has yet been devised which is entirely reliable and satisfactory.

Of the organic constituents of plants those of most concern to the agricultural chemist are the so-called food constituents, which determine the value of the plant as food for animals or man. These may be divided into the nitrogenous, or those containing nitrogen, and the non-nitrogenous substances. The nitrogenous are grouped under the name of protein and include albuminoids, containing about 15 to 18 per cent of nitrogen, the amides, and a variety of other bodies. Of the non-nitrogenous constituents, the most important are (1) the fats and oils and (2) the carbohydrates, including starch, sugars, pentoses, cellulose, fibre, etc. The protein of plants is estimated by determining the nitrogen and multiplying the result by 6¼, on the assumption that the protein constituents average about 16 per cent of nitrogen. As this does not always hold true, the result is subject to slight error. In determining the fats the material is extracted with ether, in a special extraction apparatus, the ether expelled, and the residue weighed. This is not pure fat, but contains also the waxes, chlorophyll, lecithin, and some other bodies in small quantities. The fibre or cellulose is usually determined separately from the other carbohydrates. This is done by dissolving out the other constituents of the plant with dilute alkali and acid and weighing the residue, a correction being often made for the remaining traces of nitrogen and ash. As a large variety of other carbohydrates are usually present, which are of similar feeding value, they are not determined individually, except for special purposes, but are grouped with the organic acids and some other substances about which little is known, under the general head of nitrogen-free extract. This is done on the supposition that everything else has been accounted for in the water, ash, fat, protein, and fibre determined separately; and hence the difference between the sum of the percentage amounts of these and 100 represents the nitrogen-free extract. Accurate methods have been worked out for determining the sugars, starches, pentoses, galactose, etc., separately, and these are used for special analysis. For example, in studying sugar-producing plants, the sugar is determined very exactly. The principal organic acids in plants are oxalic, malic, citric, and tartaric, and these are determined on occasion, as in analysis of fruits, beverages, and some vegetables.

In the analysis of dairy products, which comes within the scope of the agricultural chemist, the principal subjects are milk, butter, and cheese. In milk analysis the specific gravity (by lactometer), water, total solids (dry matter), fat, casein, sugar, and ash are determined, the fat being the constituent considered especially, as showing the richness of the milk and its value for butter and cheese making. (See MILK; BUTTER MAKING; CHEESE MAKING.) Butter is analyzed mainly with a view to detecting adulteration with oleomargarine, renovated butter, excess of water, etc. Cheese is examined for water, fat, nitrogen, and ash, the principal objects being to determine its food value and to detect adulteration. There is a long list of other substances which come within the scope of the agricultural chemist for analysis, such as fungicides and insecticides, human foods and beverages, tanning materials, etc., which can only be referred to here.

In dairying the investigations of agricultural chemistry have been far-reaching in their results, largely modifying dairy practice in a number of respects. For example, Babcock has worked out a rapid, simple, and accurate method of testing milk and cream as to their fat content. This test has come into very general use and has not only changed the method of paying for milk at creameries and cheese factories, but led to the selection of cows giving richer milk. The same chemist, with Russell, a bacteriologist, has made elaborate studies of the ripening of cheese, which, supplemented by those of Van Slyke and Hart, have shown the causes and nature of the chemical changes during ripening.

The inspection or control work, which is now carried on in nearly every country, has afforded agriculturists needed protection in the purchase of fertilizers, feeding stuffs, and the like, and reduced the traffic to a business basis. The percentages of essential constituents in these materials is now guaranteed by the sellers, and the goods inspected to see that they meet the guarantee. Dairy products of various kinds have been subjected to systematic inspection, and of late this has been extended to materials used for insecticides and fungicides, the consumption of which is assuming large proportions.

The earliest treatise on methods of agricultural analysis in the United States was published by Prof. G. C. Caldwell in 1869. Since 1884 the Association of Official Agricultural Chemists has been a potent factor in testing and developing methods of analysis. It holds an annual meeting and publishes a volume of proceedings and papers. Similar associations exist in Germany, Holland, and Belgium, and a number of other European countries.

Feeding and Metabolism Experiments. The analysis of plants as above shows the total amount of the constituents present; but as these are not all in form to be digested by the animal, digestion experiments are made by the chemist on live subjects. In these experiments the amount and composition of the feed consumed by the animal, and of the corresponding excreta voided, are definitely determined for a short period, and by calculation the percentages of protein, fat, fibre, and nitrogen-free extract actually digested are ascertained. These percentages are called the *coefficients of digestibility* and have to be determined for each feeding stuff separately. A method of artificial digestion has been worked out, in which the feed is treated with pepsin and hydrochloric acid and with pancreas solution, but it is not generally considered to be as reliable as the natural method. In recent years the bomb calorimeter has come into quite extensive use in the study of feeding stuffs, for measuring the fuel value, or the capacity of the feed for furnishing heat and energy for work. In this apparatus a sample of the material is ignited with oxygen in a platinum-lined bomb,

and the heat evolved is measured by means of very accurate thermometers, suspended in a water jacket surrounding the bomb. For further details regarding fuel value and the subject of animal nutrition in general, see FEEDING STUFFS; FEEDING FARM ANIMALS.

Very refined and delicate methods and apparatus have also been elaborated for studying the functions of the different nutrients in animal feeding, and the way in which they are used in the animal body in producing animal heat and energy for work, repairing the waste of the body, and making growth or meat or milk. In the ordinary feeding experiment with cattle, or sheep, or pigs, the herd is divided into equal lots and fed in periods varying from a few weeks' to several months' duration, account being kept of the amounts of food of known composition which each lot or individual eats and of the changes in weight. At the conclusion the animals are often slaughtered and the composition of the carcass determined. In this way the feeding value of nearly every available feeding stuff, and of a great variety of compound rations, has been studied, and the specific effect of nutrients from different sources on the quality of the beef, pork, butter, etc. Much of this feeding work has also been directed towards the relation of live stock to the problem of maintenance of soil fertility and the development of a rational system of agriculture. It has been shown that by feeding the crops largely on the farm where they are produced, and applying the manure to the soil, the fertility of the latter can be conserved, the supply of humus kept up, and the expense for commercial fertilizers reduced to a minimum. The reason of this is that when crops are fed to growing stock or milch cows, from 60 to 90 per cent of their fertilizing ingredients, voided in the solid and liquid manure, are retained upon the farm.

In studying the fundamental principles of nutrition, and the function of the different nutrients, the total income and outgo of the body during the experimental period must be determined. This includes the carbonic acid and other gases given off, as well as the excreta. For measuring these gases a respiration apparatus is employed, which usually consists of a closed chamber in which the animal or person is placed, with means for measuring and sampling automatically the air as it enters and leaves the chamber. With such a respiration apparatus Henneberg, Kühn, Kellner, and others have worked out the functions and relative values of the different nutrients and many of the underlying principles of nutrition. Atwater and Rosa have combined a calorimeter with the respiration apparatus and made many improvements in the accuracy of the latter. In their apparatus the chamber in which the subject is placed is a calorimeter, with very delicate arrangements for registering the heat given off by the subject. With the aid of this highly sensitive respiration calorimeter, it has been possible to demonstrate the absolute conservation of matter and energy in the body. A similar apparatus for use with animals has been constructed by Armsby.

Fertilizer Experiments. The investigations of the agricultural chemist in studying the fertilizer requirements of different crops, the value of different forms of plant food and their effect on the quality of the crop, and a wide range of similar problems, are conducted either in pots or cylinders, or in plats in the field. The preliminary studies are often made in pots or boxes, filled with sterile sand, to which definite amounts of humus and fertilizers have been added. The conditions are under complete control, and every part of the plants can be saved for analysis. These pots are usually mounted on trucks, so that they can be placed under cover at night or during a rain. The plat work is especially for testing theories under field conditions, studying fertilizer requirements, the draft of different kinds of crops, the changes in humus content and fertility of the soil under various systems of treatment, and the like. The plats are most commonly about one-tenth of an acre in area, selected with much attention to uniformity of the soil, and often underdrained and provided with basins for collecting the drainage water from each plat. Great care is exercised in preparing the land, applying the fertilizers, cultivating the crops, and harvesting them, so as to have the treatment of all uniform except as regards the special experimental feature. For studying soils in the field, samples are taken at intervals with a tube specially made for the purpose, which is driven into the ground to the depth required, removing a core of the soil. These samples are taken to the laboratory and tested or analyzed. These studies of plant production and soil fertility have been accompanied by a gradual refinement of methods, and a great deal of investigation has had purely that aim. The field covered has been very broad and has not always been strictly chemical. For example, the discovery of the ability of leguminous plants (clovers, peas, and the like) to appropriate to their use the free nitrogen of the atmosphere, and thus, under certain conditions, to enrich the soil with nitrogen from the air, was made by a German agricultural chemist, who also demonstrated the agency of bacteria in bringing about this assimilation. See GREEN MANURING; ROTATION OF CROPS.

Of late years the biological relations of soils, nitrification and denitrification, the water requirements of plants, poisonous principles of feeds and plants, the nature of the protein and other constituents of plant and animal products, the ripening of fruits, and allied topics have received the attention of agricultural chemists. The development of biological and physiological chemistry has differentiated the field of agricultural chemistry to some extent, and the more detailed classification of agriculture has tended to split up the subject among numerous departments.

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CHEMISTRY, ANALYTICAL. (See ANALYSIS, CHEMICAL.) Many special processes of analytical chemistry may be found described under the

names of the substances in conection with which they are usually employed.

CHEMISTRY, ORGANIC. See CHEMISTRY; VALENCY; CARBON COMPOUNDS; STEREO-CHEMISTRY; HYDROCARBONS; ALCOHOLS; ALDEHYDES; KETONES; ETHERS; ESTERS; AMINES; AMIDES; PHENOLS; DIAZO-COMPOUNDS; CARBOHYDRATES; SUGARS; ALKALOIDS; ETC. All the more important organic compounds may be found described under their special names.

CHEMISTRY, PHYSICAL. See AVOGADRO'S RULE; MOLECULES—MOLECULAR WEIGHTS; REACTION; CATALYSIS; SOLUTION; DISSOCIATION; THERMO-CHEMISTRY; ELECTRO-CHEMISTRY; PHOTO-CHEMISTRY; EVAPORATION; DISTILLATION; BOILING POINT; MELTING POINT; CRITICAL POINT; ACIDS; ETC.

CHEMISTRY, PHYSIOLOGICAL. One of the biological sciences, having for its object the study and investigation of the manifold chemical processes taking place in living organisms, both animal and vegetable. Physical, or mechanical, physiology deals with those functions of living organisms explainable by physical laws and studied by physical methods. Chemical physiology, or physiological chemistry, deals with those functions explainable by chemical laws and studied by chemical methods. In the study of physiological chemistry, therefore, the facts to be collected and the methods pursued are almost wholly chemical, while the application is purely physiological.

In the early days of physiological chemistry, energy was devoted mainly to the simple study of chemical composition. The various tissues and organs, especially of the higher animals, were analyzed, their chemical composition examined, and the chemical nature of the various proximate principles occurring in these tissues ascertained. It was found that 12 chemical elements enter into the composition of all living organisms—viz., carbon, nitrogen, hydrogen, oxygen, sulphur, phosphorus, chlorine, sodium, potassium, calcium, magnesium, and iron—while more recently iodine has been found widely distributed in organic combination. The first six of the above elements enter mainly into the make-up of the organic substances of the living body, while the last six occur chiefly as inorganic or mineral compounds. Sulphur and phosphorus, however, are especially characterized by the fact that they are widely distributed in organic combination—i.e., as an integral part of complex organic compounds, as proteids, nucleo-proteids, and various crystalline substances—while at the same time in oxidized form as sulphates and phosphates of the alkalies and alkali earths, they are ever present as part of the inorganic salts, or mineral matter, so abundant in animal and vegetable tissues. Iron likewise occurs both in organic combination, as in ferruginous nucleo-proteids and in the pigment of the red blood corpuscles, and in the form of simple iron salts. The ideas of physiologists were revolutionized, and physiological chemistry took on new dignity, when it was seen that the various chemical substances—both simple and complex—formed in the tissues of living organisms could be constructed in the laboratory by comparatively simple methods. (See CHEMISTRY.) As a result, there rapidly developed great activity in the study of the chemical nature and chemical relationship of the organic compounds occurring in the body; methods were devised for producing them artificially; their genetic relationships were traced out; and much light was thrown upon the conditions attending their formation in the body. To-day the study of the chemical constitution of the various end products of catabolism formed in and excreted from the body has given most useful information regarding a host of chemical processes occurring in the organism, and has enabled the physiologist to trace out many of the individual steps in the breaking down of complex organic material. In other words, chemical methods and simple chemical principles are quite sufficient to explain the nature of the many processes going on in living organisms by which the life and activity of the organism are maintained.

The various chemical processes characteristic of living organisms may be divided into two main groups, viz., synthetic and analytic; i.e., building up and breaking down. Synthetical processes are most prominent in the vegetable kingdom. The plant cell alone has the power of building up complex organic compounds out of simple elementary substances. The most striking illustration of this constructive power is seen in the formation of proteid or albuminous material. This important constituent of every living cell, in part the chemical basis of protoplasm, is formed in the plant cell from simple inorganic substances. The carbonic acid of the atmosphere furnishes the carbon, hydrogen is drawn from the moisture, nitrogen from ammonia or nitrates in the air and water, oxygen from the air, sulphur and phosphorus from the sulphates and phosphates of the soil. From these elements proteid, the most complex organic substance known in nature, is constructed. As indicative of its chemical composition, we ascribe to it various formulas according to its exact nature, for there are many different proteids in both the animal and vegetable kingdoms. Egg albumin is represented by the formula $C_{204}H_{322}N_{62}O_{66}S_2$; vegetable globulin, by the formula $C_{292}H_{481}N_{90}O_{83}S_2$. Investigations in recent years have shown that there exist very subtle, though quite distinct, differences between proteids, which as yet cannot be detected by purely chemical methods. By means of a biological test (the precipitin test) it was demonstrated that proteids of the tissues of an animal of one species differ from those of another, and on the other hand that all proteids of one animal or of animals of the same species possess a certain degree of similiarity. This necessitates a change in our view of the difference between the function of animal and of plant cells. According to the older view the animal cell does not possess the power to synthesize proteid. At present it is evident that proteids of the foodstuffs are totally reconstructed before they are assimilated and transformed into body proteid. It is nevertheless true that in the animal kingdom synthetical processes are limited. An example of the most frequent type of synthetic reactions in the animal is presented by the formation of hippuric acid. Glycocoll and any benzoyl-containing compound, on passing through the kidney, are, under the influence of the epithelial cells of the kidney and the ever-present blood, made to combine, and hippuric acid results. This reaction may be formulated as follows:

$$\underset{\text{Glycocoll}}{CH_2(NH_2)COOH} + \underset{\text{Benzoic acid}}{C_6H_5COOH} = \underset{\text{Hippuric acid}}{C_6H_5CO.NH.CH_2COOH} + \underset{\text{Water}}{H_2O}$$

In the animal body, however, analytical processes are most conspicuous. These analytical or destructive changes are of various kinds, such as *hydrolysis*, *oxidation*, *reduction*, etc. Examples of hydrolytic decomposition or change are perhaps best observed in connection with the digestive processes. Here the various classes of foodstuffs, under the influence of the digestive juices, are gradually transformed into more or less soluble and diffusible products well fitted for absorption. Proteid, e.g., is converted into a series of soluble proteoses and peptones —a transformation brought about by certain enzymes or ferments, such as pepsin and trypsin. The change, little understood, is termed "catalytic," since it is assumed to occur through mere contact of the enzyme; but what really happens is the taking on by the proteid of one or more molecules of water (hydrolysis) with subsequent splitting or cleavage of the molecule, and formation of a number of simpler products. Hence the products are frequently termed "hydrolytic cleavage products." A like transformation occurs in the digestion of starch with saliva or pancreatic juice, whereby soluble dextrins and sugars result, under the influence of the enzymes contained in the above secretions. Further, cane sugar, under the influence of the invert ferment secreted by the intestinal cells, is split into two molecules of a simpler sugar during digestion, as a result of simple hydration. The reaction which takes place may be represented as follows:

$$\underset{\text{Cane sugar}}{C_{12}H_{22}O_{11}} + H_2O = \underset{\text{Dextrose}}{C_6H_{12}O_6} + \underset{\text{Levulose}}{C_6H_{12}O_6}$$

Oxidation, another analytical process, serves a different purpose. Oxidation is the principal method by which the organic material of the tissues is broken down. Naturally this oxidation is brought about in some measure by the oxygen coming to the tissues in the arterial blood; but oxygen itself does not possess the power of oxidizing tissue constituents, and as yet the exact process by which the oxygen of the blood is caused to act on tissue components remains a subject of speculation. There are present in tissues of the animal body, as well as in vegetable tissues, peculiar ferments such as the oxidases which are capable of inciting oxidation. Many of the oxidation processes going on in the animal body seem to be connected with the life of the cell of the tissue or organ involved, but it is quite probable that in most, if not in all, such cases there are really oxidizing enzymes present, generated no doubt by the activity of the cell. The process of oxidation is the means by which the organism is furnished with that energy which is required to maintain its vital functions. The potential energy of the foodstuffs, the fuel of the animal body, is derived from the sun. As Bunge has stated it, "all the potential energy of vegetable substances is converted sunlight." The foodstuffs, whether animal or vegetable, are rendered capable of absorption by the several digestive processes. After passing into the blood or lymph, they are carried to the various organs and tissues of the body, where they are assimilated, and, by processes of anabolism, are built up, in part, into the tissues of the body, in part directly burned with liberation of their energy. This energy shows itself either in the form of heat or as work—i.e., muscular movements, or organized movements by which we perform work. The sum of the work performed by an animal, and of the heat which it gives out, is the exact equivalent of the potential energy contained in the food taken in, or in the material of the tissues burned up. This energy is liberated as the result of oxidation, and the energy is essentially the same in amount, whether the oxidation is carried on in the body or by combustion outside of the body. In other words, the amount of energy liberated is the same whether the foodstuff or its equivalent is burned directly to carbonic acid and water, or whether it is broken down gradually, step by step, until the final stage in the oxidation is reached. A man of average body weight, doing an average amount of work, must consume food material sufficient to yield 3000 kilogram-degree units of heat, or 3000 large calories, if he is to keep himself in equilibrium. The amount of heat required to keep the body continuously at 38° C., no matter what the temperature of the surrounding air, is by no means small, and, in addition, it is to be remembered that all the involuntary muscular movements, such as the beating of the heart, the muscular movements involved in respiration, and the constant movements of the intestinal walls, involve a large expenditure of energy which is quite independent of the energy required for muscular contraction when some task is to be performed. Consequently, in the case of an active man, the amount of chemical activity involved in the various processes incidental to the liberation of the required energy is large. The rôle of the process of reduction in furnishing the organism with the required heat and energy is as yet not known, but that the process does occur in the animal body is evidenced by the formation of the pigments of the urine and of the fæces from that of the bile.

The efficient and economical liberation of this energy in the body is dependent not only upon the completeness of digestion, the readiness of absorption and assimilation, and the efficiency of the circulation, but much depends also upon the proper working of the excretory apparatus. Waste products formed in oxidation must be removed, otherwise the physiological rhythm is interfered with. The ashes and clinkers must be taken from the human furnace if the fires are to be kept burning freely. For this purpose the skin, lungs, and kidneys are efficient channels, and the study of the excretions poured out through these several emunctories throws much light upon the extent and character of the oxidation going on in the body. It is a truism that the chemical study of the urine throws light especially upon the extent and character of the proteid metabolism going on in the body. The nitrogenous waste products—those which come from the breaking down of proteid material—find their outlet through the urine, and abnormalities in this excretion have a significance easy of interpretation.

It must not be overlooked, in considering the domain of physiological chemistry, that its scope is a broad one. The chemical processes going on in the animal body, e.g., are multitudinous. There are few functions in which physiological chemistry does not play some part, and the light which its study throws upon physiology as a whole can hardly be estimated. The phenomenon of muscular contraction is in great part chemical. Until the discovery of muscle plasma and the contained myosinogen by Kühne,

physiologists were in the dark regarding what took place inside the muscle fibre during contraction and after the death of the fibre. The discovery of glycogen in the liver by Claude Bernard, and the relationship of glycogen to the sugar of the blood, opened up the whole subject of the glycogenic function of the liver and thereby paved the way for a clearer understanding of the function of carbohydrate material in the body. The subject of secretion and the mode of formation of the digestive enzymes from their precursors, the zymogens, inside the cells of the secreting glands, was unraveled in great part through the application of chemical methods by such eminent physiologists as Corvisart, Kühne, Heidenhain, and Langley.

The study of lymph formation was rendered possible through the use of chemical methods, and the same methods of study have taught physiologists all that is known regarding the chemical nature of the blood, its various chemical constituents, and the various parts played by the serum, plasma, and corpuscles in the coagulation of the blood and in many normal and abnormal processes.

Metabolism in the liver—aside from glycogen formation—has had much light thrown upon it by chemical methods of study, and the whole broad subject of internal secretion and the ductless glands has been helped forward at a rapid pace by the work of physiological chemists, who have unraveled in part the chemical nature of the specific substances responsible for the physiological action of the various secretions.

Lastly, mention may be made of the part which physiological chemistry is now playing in the development of our knowledge concerning bacteriology and the infectious diseases. The microorganisms which are responsible for the various infectious diseases now preying on mankind owe their action in great part to specific chemical poisons which they produce. The chemical nature and physiological action of these poisons is being carefully studied, and, with fuller knowledge of their properties, ready methods for combating these diseases will be available. Even to-day our knowledge of these toxins is considerable, and more than one antitoxin has been discovered by which immunity can be secured or a logical method of treatment devised. Here is a large and practical field for the application of the principles and methods of physiological chemistry, and we may hope in the near future for such an extension of our knowledge of bacterial poisons as will enable us to cope successfully with these destroyers of health and life. A study of physiological chemistry promises expansion of knowledge concerning the normal changes occurring in the organism, and also affords a means of recognizing the approach of abnormal conditions, the forerunners of disease and death.

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CHEMISTS AND DRUGGISTS, LAWS RELATING TO. In the United States the terms "apothecaries," "druggists," "pharmacists," and sometimes "chemists," are used with little or no distinction as names of those licensed to compound and sell drugs and medicines upon prescriptions of physicians or otherwise; in Great Britain, however, a legal distinction exists between the three classes—apothecaries, chemists and druggists, and pharmaceutical chemists.

The Law of 1868, designed especially to restrict the sale of poisons, made the classification just referred to for the sake of public convenience. Under this law apothecaries are from practically a lower branch of the medical profession, having the right to practice in certain classes of cases; chemists and druggists are those who have passed an examination at the pharmacy college and have received a license to sell and compound drugs and poisons; pharmaceutical chemists are those who have passed a second, "major," examination, and who constitute a higher branch of the profession. Laws relating to the business of selling and compounding drugs and medicines, under whatever name the business is carried on and whether in the United States or in England, are either laws limiting and defining the qualifications of those who may carry on the business, or restricting the sale of poisons or intoxicating liquors, or defining the liability for injuries caused by carelessness or ignorance. Generally speaking, the statutes of the States in the United States require a person wishing to adopt the profession of druggist either to pass an examination before a board appointed for that purpose, or to produce a diploma from a college of pharmacy recognized as having authority and weight. Either State or city ordinances prescribe the conditions under which poisons may be sold, directing, e.g., that certain kinds of labels be used on bottles containing the poisons, and that the names of persons purchasing be entered in a book open for public inspection. Druggists are sometimes also forbidden to sell certain drugs or liquors except on physicians' certificates. Gross carelessness on the part of a druggist in compounding a prescription, if it leads to death or serious injury, is a penal offense; if death ensue, the offense usually amounts to manslaughter.

CHEMITYPE. A process invented by C. Pül, of Copenhagen, in 1843, for producing on a metal plate an engraving in relief. A design is etched or engraved on a polished plate of zinc, and the depressions filled with a melted metal, the composition of which is secret, which is then reduced to the exact level of the zinc, so that the design appears as if inlaid. An acid is then applied to the surface, which dissolves the zinc, leaving the inlaid metal in relief, and from which an electrotype may be made, or the orig-

inal may be used directly on the printing press. The process was formerly employed for printing maps, but is now seldom used. The term "chemitype" has also been applied to several processes for obtaining drawings or impressions from an engraved plate in relief, suitable for printing on an ordinary press.

CHEMNITIUS, MARTIN. See CHEMNITZ, MARTIN.

CHEMNITZ, kĕm'nĭts (from OCh. Slav. *kamenĭ*, Lith. *akmu*, stone, Gk. ἄκμων, *akmōn*, anvil, Skt. *aśman*, stone). One of the foremost manufacturing towns in Germany, and the third in population, in the Kingdom of Saxony, situated in a fertile valley at the base of the Erzgebirge, on the river Chemnitz, about 38 miles west-southwest of Dresden (Map: Germany, E 3). The city consists of an older inner town, almost circular in form, intersected by narrow streets, completely surrounded by modern suburbs. Among its numerous squares and public places are the Hauptmarkt, which contains the Old Rathaus, a handsome late Gothic structure; the Neumarkt; the Königs-Platz, with the church of St. Peter and the Royal Technical Schools; the Stadtpark, and the gardens surrounding the castle pond. Its notable public buildings include the church of St. James, of the fifteenth century, restored in 1880; the New Rathaus, post office, Imperial bank, law courts, Central Railway station, the city theatre, King Albert Museum, the large cattle market, and the castle. The city owns its water, gas, and electric works, maintains a municipal pawnshop, and is the seat of government of the district. Its educational institutions include a gymnasium, numerous schools for the technical branches, including schools of agriculture, commerce, engineering, and the various crafts, in addition to several elementary schools. There is also a municipal library of over 35,000 volumes. Chemnitz has grown from a small city to be called "the Saxon Manchester." Its locomotive and machinery construction shops employ over 20,000 men; ranking with them is the manufacture of textiles which are largely exported to the United States. It also has large manufactories of carpets, dyestuffs, chemicals, leather, vehicles, and beer. Its growth during the past 20 years has been phenomenal. Pop., 1900, 207,000; 1910, 287,340.

Chemnitz was originally a settlement of the Wends; but the present town grew up around a Benedictine monastery which Emperor Lothair founded in 1125. By 1300 it had a fully organized communal government and in 1414 it received municipal rights. It possesses, as do few other German cities, an unbroken history as an industrial city from the thirteenth century, when bleacheries were first established, to the present. In the Thirty Years' War Chemnitz was laid waste; but later in the century the introduction of cotton manufacturing revived its prosperity. Consult Zöllner, *History of the Manufacturing and Commercial City of Chemnitz* (Chemnitz, 1891).

CHEMNITZ, kĕm'nĭts, **KEMNITZ, CHEMNITIUS,** MARTIN (1522–86). Next to Luther and Melanchthon the most distinguished German Protestant theologian of the sixteenth century. He was born at Treuenbrietzen, in Brandenburg, Nov. 9, 1522; studied at Frankfort-on-the-Oder and Wittenberg; and in 1548 became rector of the cathedral school of Königsberg. About 1550 he began to devote himself seriously to theology, and in 1553 went back to Wittenberg, where he became familiar with Melanchthon and delivered prelections on *Loci Communes*, whence sprang his own *Loci Theologici*, which for method and learning excels all similar books of the same age. In 1554 he was made a preacher in Brunswick, where he wrote his *Repetitio Sanæ Doctrinæ de Vera Præsentia Corporis et Sanguinis Domini in Cœna Sacra* (1561), in which he defended Luther's view of the Lord's Supper against that of the Swiss reformers; the *Theologiæ Jesuitorum Præcipua Capita* (1562); and the *Examen Concilii Tridentini* (4 vols., 1565–73), a work in which he argued with remarkable acuteness and learning against the dogmas of the Church of Rome. His *Corpus Doctrinæ Prutenicum* (1567), written in conjunction with Joachim Mörlin, became a standard work of divinity among the Prussian Protestants. But his greatest ecclesiastical achievement was inducing the Saxon and Swabian churches to adopt as their confession of faith the *Concordienformel*, and thus extending and consolidating the creed of Luther. He died in Brunswick, April 8, 1586. For his life, consult C. G. H. Lentz (Gotha, 1866). Consult also R. Mumm, *Die Polemik des M. Chemnitz gegen das Konzil von Trent* (Leipzig, 1905).

CHEMNITZ, MATTHÄUS FRIEDRICH (1815–70). A German poet, born in Barmstedt, Holstein. For a number of years he was editor of the *Hamburger Nachrichten*. He is best known as the author of *Schleswig-Holstein meerumschlungen*, which, as set to music by Bellmann, was extremely popular throughout Germany, particularly in 1848–49 and 1863–64.

CHEMNITZER, or **KHEMNITZER,** kĕm'nĭt-sĕr, IVAN IVANOVITCH (1745–84). A Russian fabulist, born at Yenotayevsk, Astrakhan, the son of a German physician of Chemnitz, who had served in the Russian army under Peter the Great. He participated in the campaigns of the Seven Years' War and afterward devoted himself to mining engineering and subsequently visited Germany, Holland, and France. Upon his return he accepted a position as Consul to Smyrna, where an attack of melancholia hastened his death. In contradistinction to Sumarokov and others among the earliest fabulists of Russia, whose works are essentially satires, Chemnitzer was the first to introduce the genuine fable into Russian literature. He was thus one of the predecessors of Krylov (q.v.), having brought the Russian fable to its greatest perfection. Although to some extent translations or imitations of La Fontaine and Gellert, his works show considerable originality. Their good humor, vivacity of dialogue, simplicity, and distinctively national character have greatly endeared them to the Russian people. Among his best original fables are *The Metaphysician*, *The Tree*, *The Peasant and his Load*, and *The Rich Man and the Poor Man*. The latest and best edition of his works is that of Grot (St. Petersburg, 1873).

CHEMOSH, kē'mŏsh. The national god of the Moabites, mentioned as such in the Bible (Num. xxi. 29; Jer. xlviii. 46) and on the Moabite Stone. He bears the same relation to the Moabites as the national deity Yahwe does to the Hebrews. Little is known of the worship of Chemosh; the Moabite Stone tells that Mesha, King of Moab, built a high place for the worship of his god; and when Solomon, as a political symbol of his control over surrounding na-

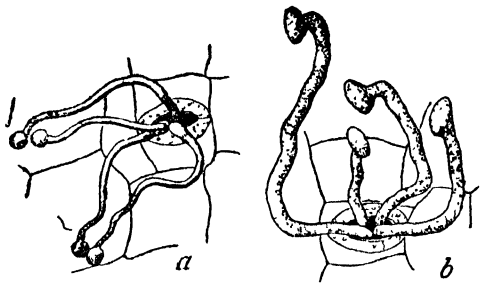
tions, introduced the official cults of other deities by the side of the national Yahwe, he also built a high place in Chemosh's honor. From the fact that the King of the Moabites offered up his son to the god (2 Kings iii. 27), it has been conjectured that human sacrifices formed part of the worship of Chemosh. The Ammonites are apparently said to have worshiped Chemosh (Judg. xi. 24), but the passage (Judg. xi. 12–28) in which this statement occurs is probably an interpolation and should refer to Moab. Chemosh was formerly variously identified with Saturn or Mars, but these identifications have no value. The etymology of the name is not known. Consult E. Renan, *Mission de Phénicie* (Paris, 1864); G. A. Barton, *A Sketch of Semitic Origins* (New York, 1902).

CHEM'OSYN'THESIS. See PHOTOSYNTHESIS.

CHEM'OTAX'IS (Neo-Lat., from Gk. χημεία, *chēmeia*, alchemy + τάξις, *taxis*, arrangement, from τάσσειν, *tassein*, to arrange). The sensitiveness of free-swimming organisms to certain chemical substances, by virtue of which they approach or recede from the source of the substance. Chemotaxis seems to be fundamentally the same as chemotropism (q.v.), though the reaction is unlike. It has been held that in many organisms the unequal stimulation of different parts of the creature by the diffusing chemical substance causes the motor organs on one side to act more strongly than those on the other. Thus the body is swung around in the medium until it is so placed that all sides are equally stimulated. This condition occurs only when the axis of the organism coincides with some of the lines of diffusion of the stimulating chemical compound. Since the motor organs still act, but now equally on all sides, swimming must take place either towards or away from the source of diffusion. More recent study, however, has shown that with certain substances the organisms, swimming in all directions, accidentally pass into the constantly increasing sphere of influence of the diffusing substance; but as they swim through it, reach the limit, and are about to pass out into the pure solvent again, a reaction occurs which reverses the movement of the motor organs. The creatures thus seem to rebound from the invisible limit whenever they reach it. The region occupied by the diffusing substance therefore acts as a trap into which they may pass but from which they cannot escape. Other substances repel a given organism. In this case the reversal of motion occurs as soon as they reach the boundary of the region occupied by the diffusing particles.

Chemotactic sensitiveness is observed, among plants, in zoöspores of various algæ and fungi, in sperms of mosses and ferns, and in many bacteria. Fern sperms are attracted by malic acid and its salts, as well as by many salts of the common mineral acids. Sperms of mosses are attracted by cane sugar. Such reactions may be demonstrated as follows: Very fine capillary glass tubes are prepared, of such diameter that the sperms can swim easily into them. These are cut into lengths of about 1 centimeter, and one end of each is sealed in the flame. These tubes are submerged in the solution to be tested, and the whole is exhausted of air under an air pump. Air is then allowed to reënter the receiver, and the fluid is forced into the tubes, leaving only a small bubble of air at the closed end. A drop of water containing the sperms is now mounted on a microscopic slide in the ordinary way. The tubes just described are placed under the edges of the cover glass, their open ends inside. After a short time the sperms may be observed swimming towards and into the tubes or away from them. The mode of response of an organism is profoundly influenced by the concentration of the substance. See TROPISM.

CHEMOT'ROPISM (from Gk. χημεία, *chēmeia*, alchemy + τροπή, *tropē*, a turning, from τρέπειν, *trepein*, to turn). The sensitiveness of certain plant organs by virtue of which they change the direction of their growth when acted upon by chemical substances. If an organ bends so as to grow towards the source of a substance, it is said to be positively chemotropic



CHEMOTROPISM.

Positive chemotropism. *a*, hyphæ of a fungus, *Mucor*, entering stoma of leaf of *Tradescantia* which has been injected with ammonium chloride; *b*, pollen tubes of *Digitalis* entering stoma of same, injected with 4 per cent solution of cane sugar. (After Miyoshi.)

to that substance; if it turns away from it, it is negatively chemotropic. The organ tends to place itself so that it shall be equally stimulated on all sides by the diffusing chemical substance. In elongating organs, such as roots, fungous filaments, etc., the reaction is one of growth; the curvature is brought about either by the retardation of growth on one side or by its acceleration on the other, or by both together. Of course the side on which retardation occurs becomes concave; the opposite side convex. If a root is positively chemotropic towards a substance, that side which comes in contact with the most of the substance—as the latter diffuses through the medium in which the root is growing—will be retarded in growth and become concave. If the root is negatively chemotropic, acceleration of growth will take the place of this retardation, and that side will become convex. Thus the root tip is turned either towards or away from the source of the diffusing compound, and the bending continues until all sides are equally stimulated. The reaction is seen in case of many gases, liquids, and solids when dissolved in water. The term "aërotropism" (q.v.) has been applied to the power of responding to gases in this way. An example of chemotropism is the following: If fungi be grown in a plate of moist gelatin, and an excess of sugar be added to a certain part of the gelatin plate, the filaments will bend and grow from all parts of the medium towards the part which is richer in sugar. The diffusion of the sugar from this region into the surrounding material is the occasion of the response. For chemotropism in animals, see TROPISM, *Chemotropism*.

CHEMULPO, chĕ-mŭl'pō. The most important treaty port of Korea, situated on the west coast, at the mouth of the Han River, about 25

miles southwest of Seoul, whose port it is (Map: Korea, G 4). There are native, Chinese, Japanese, and European quarters. The port was opened to Japanese commerce in 1881 and to that of the world in 1883. In 1911 the imports amounted to over $7,227,000, consisting chiefly of textiles, silk, metals, railroad material, and petroleum; the exports amounted to over $1,948,000, consisting mostly of rice, beans, ginseng, hides, wheat, and paper. In 1900 a railroad connection was established with Seoul. Improvements by the Japanese have made the river navigable. Pop., 1900, about 27,000 (4200 Japanese, 1260 Chinese, and 86 Europeans and Americans); 1909, 25,167. In October, 1906, there were 13,603 Japanese. At the outbreak of the Russo-Japanese War a Japanese force landed in Chemulpo, Feb. 8, 1904. On the following day a Japanese squadron under Admiral Uriu destroyed a Russian cruiser and gunboat outside the harbor.

CHEMUNG (shĕ-mŭng′) **FORMATION.** A series of sandstones and shales of marine origin, constituting the uppermost member of the Devonian system in southern and western New York and eastern Pennsylvania, and deriving its name from the Chemung Narrows, near Elmira, N. Y., where the formation was first described. The Chemung strata formed the top of the "New York system" of the early New York State Geological Survey. It succeeds the Portage formation, which it conformably overlies, and which it resembles in the shallow-water character of most of its deposits. The rocks are mostly shales, though sandstones are frequent. In the vicinity of its original locality, near Elmira, the Chemung formation has a thickness of about 1500 feet; it thins westward towards the Pennsylvania-Ohio line, where it disappears. Towards the east it changes its character, the marine deposits giving way to the estuarine and brackish-water deposits of its littoral facies, the Catskill formation (q.v.). Southward, through eastern Pennsylvania, the thickness of the marine deposits increases, and along the northern Appalachian Mountains the formation is from 3500 to 5000 feet thick.

The Chemung rocks, as a rule, abound in fossil contents. Brachiopods are most abundant, in places forming whole layers of rock, where the shells were washed together by currents and strewn over the shallow bottoms. They include forms belonging to the genera *Spirifer, Rhynconella, Atrypa,* and *Productella.* Land plants, prophetic of the forms seen in the later coal measures, are common in the more easterly portions of the formation, especially in the estuarine beds of the Catskill series, where a large fern, *Archæopteris* (q.v.), is often found. At several localities in western New York have been found large numbers of Dictyospongidæ (q.v.), allies of, and probably when alive just as beautiful as, the modern glass sponge (*Euplectella*). Some phyllocarid crustacea have been found, and in a few localities "fish beds" have yielded good examples of *Holoptychius, Bothriolepis,* etc. The economic products of the Chemung consist of building stone, and oil and gas in the western counties of New York.

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CHENA, chē′nȧ (Hind.). The Hindu name of the most common and widespread species (*Ophiocephalus striatus*) of the "walking" or serpent-headed fishes. See WALKING FISHES.

CHENAB, chē-näb′ (Pers., gathering of waters). The largest of the five rivers which give name to the Punjab (q.v.), British India (Map: India, B 2). It rises at an altitude of 14,000 feet above sea level in the western Himalayas, flows through the Ritanka Pass, and after a southwest direction enters the plains of the Panjab at Riasi. It receives from the right the Jhelam, and from the left the Ravi and the Ghara, with its affluents, the Sutlej and the Beas. After its junction with the Ghara, near Uchh, it is called the Panjnad ('five rivers') and flows into the Indus near Mithankot. Its length is about 750 miles. It is navigable by rafts 50 miles below Riasi.

CHENAVARD, shȧ′nȧ′vär′, PAUL JOSEPH (1807–95). A French painter. He was born in Lyons, studied at the Ecole des Beaux-Arts, Paris, under Hersent, Ingres, and Delacroix, and passed two years in Italy copying the old masters. A student also of philosophy and æsthetics, he dreamed of reforming painting and making it play a political and social rôle. He was called the "orator in painting," and by his witty and learned conversation exercised a great influence over his contemporaries. After the revolution of 1848 he began a series of mural decorations in grisaille representing the history of humanity, but, owing to political conditions, he was forced to abandon this long-cherished project at the end of three years. Some of the cartoons for this work have been preserved in the museum at Lyons, which also possesses a number of his paintings, such as "Hell," "Purgatory," "Paradise," "The Deluge," and the "Death of Socrates." Another important work is the "Divina Tragedia," or "End of all Religions," in the French Senate. His drawing is excellent, but his contempt for color often makes his work appear cold and heavy. Consult Germain, *Les artistes lyonnais* (Lyons, 1910).

CHE′NERY, THOMAS (1826–84). An English journalist and Arabic scholar. He was born in Barbados, was educated at Eton College and Caius College, Cambridge, and became correspondent for the London *Times* in the Crimean War. Afterward he became a writer of editorials and in 1877 succeeded John T. Delane as editor of the *Times.* He was an excellent Arabic and Hebrew scholar, was professor of Arabic at Oxford from 1866 to 1877, and was a member of the company of the Old Testament revisers. He served for several years as secretary to the Royal Asiatic Society and published a translation of the *Six Assemblies* of Hariri (1867) and an edition of the *Machberoth Ithiel* of Harizi (1872).

CHE'NEY, CHARLES EDWARD (1836–1916). A bishop of the Reformed Episcopal church in America. He was born in Canandaigua, N. Y., and graduated at Hobart College in 1857 and two years later at the Theological Seminary of Virginia. He was ordained to the Protestant Episcopal priesthood and in 1860 became rector of Christ Church, Chicago. For refusing to use the word "regenerate" in the baptismal offices, he was tried and suspended by an ecclesiastical court, and when he refused to yield was deposed from the priesthood. Soon afterward (in December, 1873) he was chosen Assistant Bishop, and afterward Bishop, of the Reformed Episcopal church, then newly organized, and became again rector of Christ Church, Chicago, the parish following its pastor into the new communion. His published works include: *Twenty-eight Sermons* (Chicago, 1880); *A Word to Old-Fashioned Episcopalians* (Philadelphia, 1884); *What do Reformed Episcopalians Believe?* (1888); *A King of France Unnamed in History* (1903); *The Enlistment of the Christian Soldier* (Chicago, 1893); and *The Second Norman Conquest of England* (1907).

CHENEY, EDNA DOW. See CHENEY, SETH W.

CHENEY, JOHN. See CHENEY, SETH W.

CHENEY, JOHN VANCE (1848–). An American librarian, poet, and essayist, born in Groveland, N. Y. After practicing law for a year in New York, he removed to San Francisco (1876), and became librarian of the Free Public Library from 1887 to 1894. From 1894 to 1899 he was librarian of the Newberry Library in Chicago. His publications comprise several volumes of poems, including: *Thistle Drift* (1887); *Queen Helen and Other Poems* (1895); *Out of the Silence* (1897); *For Thinking Hearts* (1901); and two volumes of essays: *The Golden Guess* (1893), *That Dome in Air* (1895); *At the Silver Gate* (1911). He edited the *Caxton Club Scrap-Book* (1904).

CHENEY, SETH WELLS (1810–56). An American draftsman and engraver. He was born in South Manchester, Conn., and, together with his brother John, studied painting under Isabey and Delaroche in Paris. They both practiced engraving also in Paris, and Seth Cheney's work, though not extensive, is noted for its charm of expression. In 1841 he opened a studio in Boston and soon obtained prominence through his portraits in crayon, being the first to practice this art on a large scale in the United States. He excelled especially in his ability to express character in individual heads. Among his best-known sitters are James Russell Lowell, Theodore Parker, and William Cullen Bryant. His widow, EDNAH DOW CHENEY (1824–1904), was a well-known author. She took an active part in the Freedmen's Aid movement, and was later a prominent advocate of woman suffrage.—JOHN CHENEY (1801–85) was probably the best American engraver of his day for illustrated holiday books. His heads of young girls, especially, are finely executed and very charming.

CHENG-TU, cheng-to͞o'. A Chinese city, capital of the Province of Sze-chuan, situated on the river Min, in the midst of a fertile plain (one of the largest in the Empire) and a rich mining region (Map: China, B 5). Famous in Marco Polo's time, it is still one of the richest cities in China, with clean streets and canals, carrying on a flourishing trade with the cities of the Yang-tze River valley. It has telegraphic and postal connection with many other places in the province, and railways to K'ui-chou-fu and farther east are under construction. Better-class overland roads connect the city with Ichang and the Yang-tze ports. In the arsenal, which has machinery of German and British make, rifles and cartridges of the Mauser pattern are turned out. It has a population estimated by some as nearly 1,000,000.

CHÉNIER, shā'nyā', ANDRÉ MARIE DE (1762–94). A French poet. He was born in Constantinople, where his father, Louis de Chénier, a historian of some note, was Consul General. André was sent in infancy to France and studied in Paris. His mother was Greek, and he had a strong predilection for Greek poets, from whom he adapted verses as early as 1779. In 1782 he entered the army, but resigned that year and gave himself up to study and poetry, writing idyls and planning longer works. His health failed from overstudy, and he passed 1785–86 in travel. On his return he conceived a passion for Madame de Bonneuil that inspired many of his elegies, remarkable for their classic purity of language and their restrained vigor of thought, and showing him an apt, probably the aptest, pupil of the Greek anthologists. He wrote also at this time, in imitation of Ovid, a poem on the "Art of Love"; a poetic theory of æsthetics, "L'Invention"; and a Lucretian philosophic poem, "Hermes," which remains a noble fragment; but "Susanne," a Miltonic treatment of the biblical legend, is little more than a preliminary sketch. None of this work was then published. In 1787 Chénier went as Secretary of Legation to London. This uncongenial post he resigned in 1790, and entered with patriotic zeal into the revolutionary movement, joining the moderate party as a lover of liberty and a hater of anarchy. He wrote a manifesto in this spirit for the Society of '89, which brought him a medal from Stanislas Poniatowski of Poland and fierce denunciation from Camille Desmoulins, in *Les révolutions de France et de Brabant.* In 1791 he wrote the *Jeu de Paume,* a superb Pindaric ode on the meeting of the Third Estate. The same year he was defeated in the election for the National Assembly. In 1792 his anti-Jacobin attitude involved him in sharp controversy, and the fall of the monarchy made him resolve to retire from politics and devote himself to study and art.

But the trial of the King brought him again to the front. He offered to share in the preparation of the King's defense and in the responsibility for it. Then, broken in spirit, he withdrew to Rouen and Versailles, whence he wrote the striking poems, "A Versailles" and "A Fanny." He could not resign himself to be a passive spectator of the Terror. On March 7, 1794, seized by agents of the Committee of Public Safety at the house of M. Piscatory, at Passy, he remained in Saint-Lazare prison till his execution, July 25. Here he wrote his most famous poems, an iambic denunciation of the Convention, and the exquisite "Jeune Captive," dedicated to his fellow prisoner, Mademoiselle de Coigny (later Duchess of Fleury). It is said that on his way to execution he recited to his fellow condemned, the poet Roucher, the opening lines of Racine's *Andromaque.* His last words are reported as: "I have done nothing for posterity, and yet I had something in me." He had indeed published only the "Jeu de Paume" and "Ode à Charlotte Corday," the

self-appointed executioner of Marat. His other poems were first edited in 1819 by Latouche. He became at once a restraining and chastening force in the new romantic poetry. He still stands among French poets as an envied model of formal purity, stately yet vigorous diction, and a lyric style that is warmly passionate, yet never obtrusively personal. The best edition —2 vols., *Poésies* and *Œuvres en prose*—of Chénier is that of 1872, ed. by Becq de Fouquières, not the earlier of 1862 of the same editor. Becq de Fouquières also edited *Documents nouveaux sur André Chénier* (1875). There is also a later edition of Chénier's *Prose* (1879) and *Poésie* (1889) by L. Moland. In 1899 appeared the two-volume edition, ed. by R. Guillard, and in 1908 the *Œuvres complètes* (2 vols.), ed. by Paul Dimoff. Consult: Becq de Fouquières, *Lettres critiques sur Chénier* (Paris, 1881); Valée, *Chénier et les Jacobins* (Paris, 1881); Rouquet, *Les Chénier, portraits, lettres, et fragments inédits* (Paris, 1891); Bertheleroy, *Eloge de Chénier* (1901); Haraszti, *La poésie d'André Chénier* (Paris, 1892); Morillot, *André Chénier* (Paris, 1894); Heller, *André Chénier* (New York, 1895); Faguet, *André Chénier* (Paris, 1902).

CHÉNIER, Marie Joseph Blaise de (1764–1811). A French poet and dramatist, the younger brother of André Marie de Chénier. He was born in Constantinople, was educated in France, and entered the army at 17, but soon left it, and at 20 produced *Azémire* (1784), a rather feeble tragedy. His *Charles IX,* however, excited in 1789 intense enthusiasm, its intrinsic merit being supplemented both by the occasion of the eve of the Revolution and by the genius of the great actor Talma, who achieved in it his first renown. This play is still acted. Other dramas, now forgotten, followed—*Henri VIII* and *Jean Calas* in 1791, *Caius Gracchus* in 1792. This last was proscribed for its anti-Jacobin phrase, "Laws and not blood," as was his *Timoléon* in the following year. He now became, as member of the Jacobin Club, a literary politician and political poet. He was successively member of the Convention, the Council of Five Hundred, the Tribunate, and of the Committees of Public Instruction, General Security, and Public Safety. Under Napoleon he was member of the Educational Jury of the Seine, and member of the Committee of Public Instruction (1803–06). He lectured on literature under Imperial patronage, and wrote, at Napoleon's command, a good *Tableau historique des progrès de la littérature française* (1808) that has been often reprinted. His most noteworthy poems are the national song, the *Chant du départ; Sur la mort de Mirabeau;* and *Sur l'oligarchie de Robespierre.* His best satires are the *Lettre à Voltaire* (1806) and the well-named *Epitre sur la calomnie* (1797), which may seem to illustrate the vice it denounces. Chénier also deserves remembrance for his work as translator, not only from the Latin and Greek poets, but from the German Lessing and the English Gray. Chénier's *Works* (*Œuvres complètes*) were collected in 8 vols. (1823–26). This edition contains notices of the author by Arnault and Daunou. Consult: C. Labitte, *Etudes littéraires* (1846); H. Welschinger, *Théâtre Révolutionnaire* (1881); A. Lieby, *Etude sur le Théâtre de Marie-Joseph Chénier* (1902); Ernst Peters, *Marie-Joseph Chénier als Kritiker und satirischer Dichter* (Leipzig, 1911).

CHENILLE, shê-nēl′ (Fr., caterpillar). A thick, velvety, tufted cord of silk, wool, or worsted, having short fibres or threads standing out at right angles from a central core of thread or wire and so bearing some resemblance to a woolly caterpillar. It is made by weaving four warp threads, or crossing three warp threads about filling threads that are afterward cut, and is used in trimming and bordering dresses, in ornamental sewing, and in manufactured trimmings, hangings, curtains, etc. In certain carpets chenille is used instead of yarn to form the filling. In embroidery also chenille is employed, being either laid on the surface of the stuff or drawn through with a needle. Chenille is used also in combination with wool or cotton in the manufacture of a cloth known as *chenille cloth.*

CHEN KIANG FU. See Chinkiang.

CHENNEVIÈRES-POINTEL, shâ-nĕv′yâr pwăN′tĕl′, Philippe, Marquis de (1820–99). A French administrator and art critic, born at Falaise. In 1851 he received the title of inspector of museums of the provinces, and in 1855 was chosen inspector general of exhibitions of art and was further given charge of the organization of the Salon at the Palais des Champs Elysée. He was also made manager of the Luxembourg Museum and in 1873 director of fine arts. His official capacity gave him the choice of artists and subjects for the decoration of the Panthéon. In 1874 he instituted a *prix du Salon,* whose recipient was given the opportunity to spend three years in study in Rome. He caused to be compiled a general inventory of the artistic treasures of France and made the teaching of drawing obligatory in the common schools. Among his numerous works on art and kindred subjects are: *Lettres sur l'art français* (1851); *Portraits inédits d'artistes français* (1853); *Les derniers contes de Jean de Falaise,* his own nom de plume (1860); *Essais sur l'histoire de la peinture française* (1894); *Les dessins du Louvre* (4 vols., 1882–84).

CHENONCEAUX, shê-nôN′sô′. A celebrated castle in the Department of Indre-et-Loire, France, built on piles in the river Cher, 4 miles east of Bléré. Its foundations were laid in 1515. It became crown property in 1535 and was a favorite occasional residence of Francis I. Henry II presented it to the celebrated Diana of Poitiers, who lavished much money on its embellishment, as did also Catharine de' Medici, after she had dispossessed Diana. Among the curiosities shown to the visitor is the mirror used by Mary Stuart, Queen of Scots, during her honeymoon spent at Chenonceaux with Francis II in 1559. The castle became private property in the eighteenth century and was long an attractive resort for the distinguished literary and scientific men of that period, including Montesquieu, Voltaire, Fontenelle, Buffon, Bolingbroke, and Rousseau. It escaped the ravages of the revolutionary period and is in a fine state of preservation.

CHENOPODIACEÆ, kē′nō-pō′di-ā′sē-ē (Neo-Lat. nom. pl., from Gk. *χήν, chēn,* goose + *πούς, pous,* foot). A family of dicotyledonous plants, consisting of herbs and half shrubs, with entire or divided leaves that are destitute of stipules. The flowers are inconspicuous, bisporangiate or monosporangiate; the perianth deeply divided, persistent; the stamens inserted into its base, opposite to its segments, and equal to them in number, or fewer; the ovary single,

free, or occasionally adhering to the tube of the perianth, with a single ovule attached to the base of the cavity; the style generally with two to four divisions. The fruit is membranous, inclosed in the perianth, which sometimes becomes fleshy. The seed has a curved or spiral embryo. There are about 75 genera and 550 known species, most of which have a weedlike appearance and grow in waste places. They are widely diffused over the world, but are particularly abundant in the northern parts of Europe and Asia. Beet and spinach are among the best-known and most useful plants of the family. Many are occasionally used as potherbs, as some species of *Chenopodium* and of *Orache*. See CHENOPODIUM.

As most of the species of this family frequent situations where the soil abounds in salt, necessitating a reduction of transpiration by the plant, many curious devices to prevent too abundant giving off of water are shown. In *Salicornia* the leaves are wholly suppressed, and the stem is curiously jointed. In many others the leaves are covered with peculiar scales or hairs, giving to the plant a mealy appearance, and structural differences are also present by which water is kept within the plant, so that there is not such a draining of the soil and consequent absorption of salt as would be expected in plants growing in salt marshes, etc. Two great groups are formed of the genera —the *Cyclolobeæ*, in which the embryo is ring-shaped or horseshoe-shaped, and *Spirolobeæ*, in which the embryo is spirally coiled. *Beta*, *Chenopodium*, *Spinacia*, *Atriplex*, *Kochia*, *Corispermum*, and *Salicornia* belong to the first group, and *Sarcobatus*, *Suæda*, and *Salsola* to the last.

CHENOPODIUM, kē'nō-pō'dĭ-ŭm (Neo-Lat., from Gk. χήν, *chēn*, goose + πούς, *pous*, foot). A genus of plants, comprising about 50 species, of the family Chenopodiaceæ, some species of which are well known by the name of goosefoot, as weeds in gardens, on heaps of rubbish, and in waste places. The species are mostly annuals, with entire or toothed leaves, which in some cases have a sort of mealy hoariness. They are mostly natives of Europe and of the temperate parts of Asia; but some are natives of America, into which, however, some of the common European species have found their way and are naturalized as weeds. The genus has perfect flowers with perianth of five small green scales, five stamens, and solitary flat seeds. The leaves of many species are used as a substitute for spinach, particularly those of the good-Henry, wild spinach, or English mercury (*Chenopodium bonus-henricus*), a perennial plant, native of Great Britain and other parts of Europe, often found growing by waysides, with stem more than a foot high, powdered with minute, transparent globules, and large, alternate, triangular, arrow-shaped, entire leaves. It is cultivated in some places, particularly in Lincolnshire, chiefly for the leaves, but the young shoots are also used as asparagus. *Chenopodium urbicum*, *Chenopodium album*, etc., annuals common in waste places, are also excellent substitutes for spinach. *Chenopodium olidum* and *Chenopodium vulvaria* (stinking goosefoot), annuals with an extremely nauseous odor, growing in waste places in Great Britain and elsewhere, especially near the sea, are popular medicines, in much repute as antispasmodics and emmenagogues. *Chenopodium botrys*, a native of the south of Europe, with pinnatifid leaves resembling those of the oak, and hence called Jerusalem oak, is in use as an expectorant and anthelmintic. It is not fetid like the species last named, but agreeably fragrant. *Chenopodium ambrosioides* has a strong aromatic odor, is used in Mexico instead of tea, and is much cultivated in France, an infusion of it being deemed useful in nervous disorders. A variety, known in the United States as wormseed, has a strong and somewhat aromatic odor, and enjoys a high reputation as a vermifuge. Its seeds are chiefly used, or the essential oil extracted from them, called oil of wormseed. More important than any of these species, as affording an important article of food in the countries of South America, of which it is a native, is quinoa (*Chenopodium quinoa*) (q.v.), the seeds of which are large and abundant and are extensively used. The coast blite (*Chenopodium rubrum*) and the strawberry blite (*Chenopodium capitatum*) are indigenous species along the seacoast, about the Great Lakes and westward. See QUINOA.

CHEN'OWETH, ALEXANDER CRAWFORD (1849–). An American engineer, born at Baltimore. He was educated at Dickinson College (A.B., 1868; LL.D., 1908) and Rensselaer Polytechnic Institute. He engaged in engineering in connection with the public works of Brooklyn and Washington and also for various railroads. In 1884 he prepared the foundation for the Bartholdi Statue of Liberty, Bedloe's Island, N. Y. In the following year he became assistant engineer to the Croton Aqueduct Commission, New York, and he was resident engineer in charge of Croton Aqueduct from 1885 until he was called (1895) to take charge of construction work for the United States Government at Sandy Hook. He invented the Chenoweth steel-concrete pile and the Chenoweth reënforced concrete revetment. He came to be regarded as an authority on foundation work and was awarded several medals and prizes.

CHENSTOCHOW, chĕn'stô-kôv'. A town of Russian Poland in the Government of Piotrkow, situated near the left bank of the Warthe, on the Warsaw-Vienna Railway, 135 miles southwest of Warsaw (Map: Russia, A 4). It consists of the old and the new town and is of considerable industrial importance. There are a number of large cotton mills, iron foundries, paper mills, breweries, flour mills, etc. Chenstochow owes its fame to the adjacent monastery of the Order of St. Paul the Hermit, situated on the Warthe and visited annually by over 400,000 pilgrims. The chief attraction is the picture of the Virgin, made of dark wood and known among the Catholics of Poland and Russia as the Black Virgin. It is supposed to be by St. Luke the Evangelist and to have been brought to the monastery at the end of the fourteenth century. The monastery was formerly fortified and in 1655 withstood a siege of 38 days by the Swedish troops. Pop., 1900, 53,650; 1910 (est.), 69,525. Its manufactures are of cotton and woolen goods, and paper. Trade is carried on in lithographs, printing, and religious emblems. It is also a cattle market.

CHENTUNG, LIANG-CHENG, SIR. A Chinese diplomat. He graduated at Phillips Academy, Andover, Mass., served as attaché of the Chinese Legation to the United States from 1886 to 1889, and was secretary to the Chinese special mission to Japan in 1895. In 1897 he was secretary of the embassy to the Diamond Jubilee in London,

and afterward served as secretary of embassies to Berlin (1901) and to London (1902). From 1903 to 1908 he was Chinese Envoy and Minister to the United States, Peru, Cuba, and Mexico.

CHENU, shẽ-nụ′, JEAN CHARLES (1808–79). A French naturalist and army physician. He was born in Metz and was educated in Paris. In 1829 he entered the sanitary corps of the army, and was in the Crimean War. During the Franco-Prussian War he was at the head of the ambulance corps. He published several valuable works on the medico-surgical statistics of modern French campaigns, edited the *Encyclopédie d'histoire naturelle* (31 vols., 1850–61), and wrote on shells.

CHEOPS, kē′ŏps. The name under which the second King of the fourth Egyptian dynasty, who probably lived about 2900 B.C. (Meyers' dating), and who built the greatest of the pyramids, is generally known. In that form the name is given by Herodotus. He is called Chembes by Diodorus, Saophis by Eratosthenes, and Souphis by Manetho; the hieroglyphic form is Khufu. He carried on successful wars against the Bedouins of the Sinai Peninsula. Herodotus' account, in which Cheops was made out to be an oppressive ruler and one who even sacrificed the honor of his daughter to obtain funds to complete his pyramid, is probably without foundation. So far as can be made out the Egyptians considered him a wise and powerful ruler, and to him the foundation of many temples was ascribed. In later times, in the twenty-sixth dynasty, together with Chephren, he was honored by a funerary cult. Various monuments bearing his name have survived; outside of Egypt there have been discovered only the inscriptions at Wady Magharah, near Sinai, where the old copper mines were worked under him. See EGYPT; PYRAMID.

CHEPHREN, or **KHEFREN,** kĕf′rĕn. A king of Egypt, the builder of the pyramid near Ghizeh, second in size of the great pyramids. The usual form of his name is taken from Herodotus; other Greek writers call him Chabyras (Diodorus). In Egyptian his name is Kha'-f-re'. The Greeks, misled by the similarity of the two names, commonly call him the brother of Cheops; but, according to Egyptian tradition, he was his son. The famous Sphinx near the pyramids was attributed to Chephren as early as about 1450 B.C., but whether correctly is much disputed.

CHEP'STER. A name used in England to designate the starling (q.v.).

CHEPSTOW, chĕp′stō. A market town and river port of Monmouthshire, England, on the Wye, about 15 miles east-northeast of Newport (Map: England, D 5). It lies between bold cliffs on a slope rising from the river. Its castle, dating from the eleventh century, but almost entirely rebuilt in the thirteenth, is well preserved. The river is notable for its high tides, which reach at times the height of 50 feet. In the neighborhood are the fine ruins of Tintern Abbey and Caldicot Castle. Pop., 1901, 3000; 1911, 2953. Consult Wakeman, "The Town and Castle of Chepstow," in *British Archæological Journal,* vol. x (London, 1855); Marsh, *Annals of Chepstow Castle* (Exeter, 1883).

CHEQUE, chĕk. See CHECK.

CHER, shâr (Gall. *Carus,* connected with Bret. *quer,* Lat. *carus,* dear). A tributary of the Loire, rising near Crocq, in the Department of Creuse, France (Map: France, S., G 2). It flows in a tortuous course for 200 miles, in a general northwest direction, until it joins the Loire below Tours. It is navigable to Vierzon, 47 miles from its mouth.

CHER. A central department of France, to which the river Cher gives its name (Map: France, N., H 6). Over 500 square miles is forest land; the rest, being mainly agricultural, furnishes abundant harvests of wheat, oats, hemp, vegetables, fruit, and pasturage for horses and cattle. It has many iron mines, saw mills, manufactories of porcelain, glass, linen, and faïence. The surface is mostly level. Climate is mild and pleasant. Area, 2819 square miles. Pop., 1896, 347,725; 1901, 345,543; 1906, 343,484; 1911, 337,810. Capital, Bourges. Consult Frémont, *Le département du Cher* (Bourges, 1862); Ménault, *Monographie agricole du Cher* (Paris, 1891).

CHERASCO, kâ-räs′kō. A city in the Province of Cuneo, north Italy, 36 miles south of Turin, near the confluence of the Stura and the Tanaro (Map: Italy, B 3). It has a domed church, two triumphal arches, a gymnasium, and a technical school; markets grain, wine, and truffles, and manufactures silk. The Peace of Cherasco in 1631 ended the Franco-Austrian War, and in 1796 the armistice of Cherasco was followed by the treaty in which the King of Sardinia ceded Savoy and Nice to France. Pop., 1901, 9054; 1911, 9312.

CHERASKOV, kâ-räs′kôv, MIKHAÏL MATVEYEVITCH. See KHERASKOFF.

CHERAW, chē-rą′. A town in Chesterfield Co., S. C., 88 miles northeast of Columbia, on the Seaboard Air Line, the Atlantic Coast Line, and the Chesterfield and Lancaster railroads, and on the Pee Dee River (Map: South Carolina, E 2). The most important industries are planing and veneering mills, lumber plants, novelty works, cottonseed-oil mills, box factories, and sash and door factory. The water works and sewage system are owned by the town. During the Civil War Cheraw was for a time a depot of supplies for the Confederates. General Sherman captured it on March 3, 1865, and destroyed an immense amount of stores, including 3600 barrels of gunpowder. Pop., 1900, 1151; 1910, 2873.

CHERBOURG, shâr′bo͝or′. A fortified seaport town and arsenal of France, in the Department of Manche, at the mouth of the Divette River and at the head of a deep bay at the north extremity of the peninsula of Cotentin, on the English Channel (Map: France, N., D 3). Among its prominent buildings are the church of La Sainte Trinité (fifteenth century), lately restored, in front of which is a bronze statue of Napoleon I; that of St. Clement; the hôtel de ville; the marine library, containing 25,000 volumes; the museum and theatre. It owes its importance to its naval and commercial harbors. Napoleon I began to build the great defenses of this northern stronghold of France. His nephew, Napoleon III, developed his plans, but not with the original view of an invasion of England. Occupying a prominent position on the French coast, only some 60 miles removed from the southern shore of England, the harbor works have been extended, strengthened, fortified, and provided with cannon, the dockyards improved, and facilities for embarkation afforded. The vast breakwater of Cherbourg incloses a space of 3700 acres. In connection with its fortifications this breakwater assumes an importance that attaches to no other work of the kind in existence. At the apex of the angle formed by

the meeting of the two branches of the breakwater, or *digue*, there is a central fort or battery, measuring 509 feet on the inner line of the parapet, which forms a flat semiellipse. The circular forts at the extremities of the breakwater are remarkably well placed for purposes of defense. Behind the centre battery there is an elliptical tower, measuring 225 feet on the major and 123 feet on the minor axis. The entrances to the harbor are around the end of the mole; and the passages are further defended by the fortifications of the Île Pélée and by the batteries of La Roche Chavaignac and Fort Querqueville. A series of coast redoubts, and the two large fortifications of Les Roches des Flamands and du Homet, are situated behind this outer zone of defense. Besides batteries on the mole, Cherbourg is defended by many regular forts and redoubts. The town itself is commanded by the towering fort and mountain of La Roule and Fort d'Octeville, on the heights behind. The military port of Cherbourg comprises a small outer harbor, the entrance to which is 206 feet wide at its narrowest point. This harbor communicates by means of a lock with a floating basin, 957 feet long by 712 feet wide. The outer harbor has four building slips for first-class ships, besides some smaller slips and a fine graving dock. In August, 1858, an inner floating harbor was opened. This harbor, entirely cut out of solid rock, has a length of about 930 yards and a breadth of 437 yards and is surrounded by building slips and capacious graving docks. Cherbourg has a safe and commodious commercial port quite distinct from the other, situated on the southeast. Among its numerous industries are shipbuilding, sugar refining, lace making, tanning, and dyeing. The United States is represented by a consular agent. Communal pop. (census of March 5, 1911), 43,731.

Cherbourg is a town of Gallic origin, and is identified with the Roman Coriallum. In the Hundred Years' War it was captured by the English (1418) after a siege of four months, but was regained by Charles VII in 1450, after which it remained in the hands of the French. Louis XIV attempted to make it a military fort, but the works were dismantled in 1689. In 1758 the English inflicted severe damage upon the fortifications. On June 19, 1864, the Confederate cruiser *Alabama* steamed out of Cherbourg harbor to meet the Federal warship *Kearsarge*, and during the historic fight that ensued was destroyed about 9 miles from the harbor.

CHERBULIEZ, shâr'bụ'lyâ', ANTOINE ELISÉE (1797–1869). A Swiss political economist and jurist, professor of economics in Geneva and afterward in the National Polytechnic School in Zurich. He was a contributor to cyclopædias and periodicals, and the author of *L'Utilitaire* (1828–30); *Théorie des garanties constitutionnelles* (1838); *Riche ou pauvre* (1840); *De la démocratie en Suisse* (1843); *Le socialisme c'est la barbarie* (1848); *Précis de la science économique* (1862).

CHERBULIEZ, shâr'bụ'lyâ', CHARLES VICTOR (1829–99). A cosmopolitan French novelist and miscellanist, son of a professor in Geneva, where he was born and where he studied history and philosophy, as well as in Paris, Bonn, and Berlin. He taught, and then traveled widely, gathering material that he afterward used in social and political essays and also in his novels. Of his writings the first, *Apropos d'un cheval* (1860), was archæological; others were scientific. He first caught popular favor by *Le comte Kostia* (1863). The best of a multitude that followed in quick succession are: *Prosper Randoce* (1868); *L'Aventure de Ladislas Bolski* (1869); *Miss Rovel* (1870); *Meta Holdenis* (1873); *Samuel Brohl et Cie* (1877); *Noirs et rouges* (1881); *Jacquine Vanesse* (1898). He is best in cosmopolitan characterizations of Russians, Poles, English, Germans, or Jews—persons of exaggerated independence, incoherent and improbable as the plots in which they figure. Cherbuliez's descriptions are varied and clever, but superficial; his psychology is weak and conventional; the story may be interesting, but the ending is apt to be trivial. He grazes burning questions of sociology or science, deftly adapting his treatment to currents of popular interest, and with a sharp, cynical, and rather narrow irony. Cherbuliez became an Academician in 1881. Several of his novels have been popular in English translations. His essays, under the assumed name of G. Valbert, are in part collected under various titles and deal with politics, literature, and art. Consult the *Eloge*, by E. Faguet, on his succession to Cherbuliez's seat in the French Academy (1900).

CHÉRET, shâ'râ', JULES (1836–). A French lithographer and mural painter. He was born in Paris, was early apprenticed to a lithographer, but as a draftsman was self-taught. He was the first to convert poster designing into a real art, opening up an entirely new field with his posters in color. His work is original and charming, his drawing skillful, his color pleasing and harmonious. Among his best posters are "Bal de Valentino," "Le petit Faust," "Pan," "Scaramouche," "Loie Fuller," "Vin Mariani," "Jardin de Paris." Cheret shows extraordinary talent as a mural painter in such decorations as the dance scenes entitled "Life's Joys," in the Hôtel de Ville, Paris, in which the grace of the rococo is combined with modern French elegance. Consult Alexandre, *Jules Cheret, Catalogue de ses œuvres, etc.* (Paris); Kahn, in *Art et decoration* (ib., 1902).

CHERETHITES AND PELETHITES, kĕr'ĕ-thīts, pĕl'ĕ-thīts. Two peoples settled in the south of Palestine and furnishing a bodyguard for David. They are mentioned together in 2 Sam. viii. 18; xv. 18; xx. 7, 23; 1 Kings i. 38, 44; 1 Chron. xviii. 17. In all these passages the troops are referred to. The Cherethites alone are mentioned in 1 Sam. xxx. 14; Zeph. ii. 5; Ezek. xxv. 16; and probably Ezek. xxx. 5. The Greek and Syriac versions translate Cherethim as "Cretans," and they are evidently regarded as belonging to the Philistines. The Pelethites are probably only a dialectical pronunciation of Philistines. There is nothing improbable in David's having a bodyguard made up of Philistines. Consult R. Kittel, *History of the Hebrews* (London, 1896); S. R. Driver, *Notes on the Hebrew Text of Samuel* (London, 1890).

CHERIBON, shĕr'ī-bŏn. The capital of the residency of that name, situated on the northern coast of Java, at the mouth of the Cheribon River, about 125 miles southeast of Batavia (Map: East India Islands, C 6). It has a good harbor, and, although it has lost to a great extent its commercial importance, it still has a considerable trade in coffee, indigo, and teakwood. It is the seat of one of the sultans. Pop., 1896, 20,792.

CHERIMOYER, chĕr'ĭ-moi'ĕr (Fr. *chérimolier,* corruption of Peruv. *cherimoles*), or CHIRIMOYA (*Anona cherimolia*). One of the most esteemed fruits of Brazil and Peru, now common and even naturalized in some parts of the East Indies and generally throughout tropical countries and cultivated upon the Keys of Florida and in California. The tree is from 15 to 30 feet in height, with drooping branches and oblong leaves which are velvety beneath. The fruit is of most delicious flavor, is sometimes described as the finest of all fruits, and sometimes as inferior only to the mangosteen. It belongs to the same genus with the custard apple (q.v.). Both flowers and fruit emit a pleasant fragrance, but when the tree is covered with bloom the odor is so strong as to be almost overpowering. The fruit varies from the size of an orange to 16 pounds or upward in weight. It is roundish or heart-shaped. Externally it is nearly smooth, greenish or brownish yellow when ripe, and often with a reddish cheek. The skin is rather thick and tough and marked off into pentagonal or hexagonal areas. Internally the fruit is snow-white and juicy and contains a number of small brown seeds.

CHERKES'SIANS. See CIRCASSIANS.

CHER'NIGOV. See TCHERNIGOV.

CHERNOZEM, chĕr'nō-zĕm (Russ. *chernozemŭ,* from *chernuĭ,* black + *zemlya,* earth). The Russian name for a very fertile black or dark-colored soil covering almost the entire southern half of European Russia and extending beyond the Ural Mountains into Asiatic Russia, where it occupies isolated areas of varying extent. Soils similar to chernozem are found in Galicia, Hungary, Rumania, northern Bulgaria, and Germany (in the region of Magdeburg and Hildesheim), as well as on the prairies of the western United States and the pampas of Argentina. Typical chernozem is formed by the admixture of humus with loess (qq.v.). It is characterized by high contents of fine particles and humus and high water capacity. The proportion of humus usually varies from 6 to 10 per cent, but is sometimes less than 4 per cent or higher than 20 per cent. The humus usually contains somewhat less than 5 per cent of nitrogen, the latter varying from .2 to .5 per cent in the soil. The soil also contains from .12 to .25 per cent of phosphoric acid and from .4 to 1 per cent of potash. Chernozem is therefore rich in plant food, and it is of great depth, so that it bears continuous culture with the same crops without deterioration; but its physical properties, due to its very fine particles, are such that under unfavorable weather conditions it loses its normal granular structure, dries out, and becomes so compact as to result in crop failures. Consult P. Kossowitsch, *Die Schwarzerde* (Vienna, Berlin, and London, 1912).

CHERNYSHEV, chĕr'nĭ-shĕf', ALEXANDER IVANOVITCH, PRINCE (1786–1857). A Russian general. He served against the French at Austerlitz and Friedland and on the side of Napoleon at Aspern and Wagram. He bore an important part in the campaigns of 1813–14; was made a count in 1825 and Minister of War in 1828. Nicholas I created him a prince in 1841. In 1848 he was made chairman of the Imperial Council.

CHERNYSHEVSKY, chĕr'nĭ-shĕf'skĕ, NIKOLAI GAVRILOVITCH (1828–89). A famous Russian author and publicist. He was born at Saratov (southern Russia) and received his early education at home under the supervision of his father, a distinguished priest. Later, at St. Petersburg University, his unusual ability soon attracted attention. Within three years after his graduation (having done teaching in the meantime) he had decided to devote himself entirely to literary work. In 1855 he appeared at the university for his master's degree with a dissertation entitled "The Æsthetic Relation of Art to Reality"; although this was well received and ably defended, the degree was denied —and the thesis confiscated. Such sensational procedure, however, served only to bring into greater prominence Chernyshevsky's brilliant work, with the result that the columns of the *Sovreménik* (the 'Contemporary'), a most influential Russian periodical at the time, were placed at his disposal. In two years (1855–57) the *Sovreménik,* with its leading essays and reviews by Chernyshevsky and Dobrolûbov (another famous publicist), became the greatest literary and intellectual force of progressive Russia.

Chernyshevsky's articles were rapidly transforming the views of thousands, when the Russian government, becoming alarmed at his influence, suppressed the epoch-making periodical and imprisoned its guiding spirit. This was in 1862. A year later, while still awaiting his fate at the Fortress of Paul and Peter, Chernyshevsky wrote *What's to be Done?,* a problem novel and the only work by which its author is known to non-Russian readers. Thereafter, on one pretext or another, he was kept in exile in Siberia for nearly 20 years, and when at last he was allowed to return to Russia health and courage were no longer equal to the task of resuming all his former activity. In 1889, within a few months of receiving leave again to live in his native town, he died.

Save the important but not very literary novel already mentioned, which exercised a tremendous influence in Russia, Chernyshevsky's creative work was all journalistic. He did, however, considerable translating and editing, of which the most important specimen is his scholarly translation, with illuminating notes and practical illustrations, of Mill's *Political Economy.* In a similar way he treated Schlosser's *Universal History* and Weber's voluminous *History of the World.* His original writings were gathered in 4 vols.—*Studies in Russian Literature in the Days of Gogol* (1890), *Æsthetics and Poetry* (1893), *Notes on Contemporary Literature* (1894), and *Critical Essays* (1895). A fuller collection of his articles appeared in 1906 in 10 vols. As a realist and materialist, Chernyshevsky helped to rid Russian thought of metaphysical speculation and to popularize science; as an exponent of the "Art for Life's Sake" principle, he gave æsthetics a utilitarian basis which won for it new favor in his generation; and as an exponent of French Socialism —especially that of Fourier—he did much to rouse the social conscience of Russia and to furnish truly scientific grounds for the unrest that characterized that country in the latter half of the nineteenth century.

CHER'OKEE. A city and the county seat of Cherokee Co., Iowa, 59 miles by rail northeast of Sioux City, on the Illinois Central Railroad and on the Little Sioux River (Map: Iowa, B 2). It is the seat of a State hospital for the insane and has a Carnegie library. Farming is the principal industry of the surrounding region.

Butter, mill machinery, and novelties are manufactured in the city, and there are railroad repair shops. Cherokee was settled in 1850 and was incorporated in 1872. The government is administered by a mayor, elected biennially, and a unicameral council. The water works are the property of the city. Pop., 1900, 3865; 1910, 4884.

CHER'OKEE (N. Amer. Indian, upland field). The largest and most important native tribe of the eastern United States. They are of remote Iroquoian affinity and formerly occupied the mountain region of the Carolinas, Tennessee, Georgia, and Alabama, in numerous permanent villages of substantially built log houses. They depended chiefly upon agriculture and raised large crops of corn, pumpkins, and beans. De Soto passed through their country in 1540, and for three centuries later they were prominent in the history of the South. They espoused the British cause during the Revolution, but in 1785 made a treaty of peace with the United States and at once took up the road to civilization, attaining in a very short time a high degree of prosperity and advancement. This was largely due to the work of devoted missionaries and to the presence of a respectable mixed-blood element, the descendants of former British traders. In 1820 they adopted the regular civilized form of government and seven years later formulated a constitution under the style of the "Cherokee nation." In the interval Sequoya (q.v.), known also as George Guess, had devised for the language an alphabet, which was officially adopted by the Cherokee government.

Meanwhile, however, gold had been discovered in the Cherokee country, and at once strong pressure was brought to bear to compel the removal of the Indians. Notwithstanding a decision of the Supreme Court upholding the autonomy of the Cherokee nation, the State of Georgia extended her laws over their country, and President Andrew Jackson refused to interfere in their behalf. Despite the repeated and energetic protests of more than nine-tenths of the Cherokee nation, a treaty was negotiated with a small faction which bound the tribe to remove within three years beyond the Mississippi, whither a small portion of them had removed some years before. The Cherokees repudiated the instrument, and in 1838 they were removed by military force, several thousands dying on the march or from hardships incident to the removal. Throughout this crisis the great leader of the patriot party was the chief John Ross (q.v.), who served as principal chief of the Cherokee nation from his first election in 1828 to his death in 1866. On their arrival in the Indian Territory they reëstablished their government, with Tahlequah as the capital. The outbreak of the Civil War in 1861 brought division to their councils, calamity and misery to their people, the tribe being about equally divided in sentiment and furnishing large contingents to both the Federal and Confederate forces. At the close of the war they entered into a new treaty with the United States, by which they agreed to free their negro slaves and admit them to full Cherokee citizenship. In 1892 they sold their western territorial extension, known as the "Cherokee Outlet." Under their former national government they had an elective principal chief, a Senate, a House of Representatives, and a complete system of public schools, but in 1906 they disbanded as a tribe and became citizens of the United States. The Cherokees of pure and mixed blood may number perhaps 20,000, besides whom some 1400 more, known as the Eastern Band, reside on or adjoining a reservation in western North Carolina, being descendants of those who escaped and fled to the mountains at the time of the removal. Consult Royce, "Cherokee Nation," in *Fifth Report of Bureau of American Ethnology* (1887); Mooney, "Myths of the Cherokee," in *Nineteenth Report of Bureau of American Ethnology* (Washington, 1887).

CHÉRON, shā'rôN', ELISABETH SOPHIE (1648–1711). A French painter, engraver, and poet. She was born in Paris, studied first with her father, and at the age of 20 became a member of the Royal Academy of Painting and Sculpture, then presided over by Le Brun. In 1692 she married the engineer Jacques Le Hay. Her principal works are miniature portraits in pastel and water color. Some genre and biblical oil paintings also survive. Among her engravings a series of antique reliefs and gems are worthy of mention. She was the author of a book on the *Principles of Drawing* (1706), and her reputation as a poet was such that she was made a member of the Academia dei Ricovrati.

CHEROOT. See TOBACCO.

CHERRIE, GEORGE KRUCK (1865–). An American field naturalist, born at Knoxville, Iowa. He was educated at Iowa State Agricultural College. In 1889 he became taxidermist and curator of birds, mammals, and reptiles in the National Museum of Costa Rica, and in 1894–97 he was assistant curator of ornithology in the Field Museum of Natural History, Chicago. He spent the following two years in explorations of the valley of the Orinoco for Lord Rothschild. From 1899 to 1911 he was curator of ornithology and mammalogy in the Brooklyn Institute of Arts and Sciences. Besides his articles in the *Auk*, his writings include "The Ornithology of Santo Domingo," in *Publications of the Field Museum of Natural History, Chicago* (1896), and *New Birds of the Orinoco Region and of Trinidad* (1909).

CHER'RY (AS. *ciris*, Ger. *Kirsche*, from Lat. *cerasus*, Gk. κερασός, *kerasos*, cherry tree, from κέρας, *keras*, horn). Cultivated cherries have sprung almost entirely from two parent species —*Prunus cerasus* and *Prunus avium*—both of European origin. (For illustration, see Plate of DRUPES.) Besides these species, the cherry is represented in Europe, America, Japan, and China by indigenous species, none of which have attained economic importance save the Japanese ornamental forms (*Prunus pseudocerasus*), in honor of which the famous Cherry Festival is given every year, and the Japanese weeping rose-flowered cherry (*Prunus pendula*). In America the chokecherry (*Prunus virginiana*) has sometimes been cultivated. The bird cherry (*Prunus pennsylvanica*) is grown for ornament, while *Prunus besseyi* and *Prunus pumila*, two dwarf forms native to the prairie region of the Northwest, have lately come into notice because of their fruit. The garden cherries are varieties of either *Prunus cerasus* or *Prunus avium*. To *Prunus cerasus* belong the Morellos and Amarelles—two of the three groups of *sour cherries*, in which the tree characteristics are spreading habit and willowy, drooping branches; to *Prunus avium* belong the Hearts, Bigarreaux, and Mazzards, the *sweet cherries*, and the Dukes, the third group of sour cherries, characterized by tall, robust, upright trees. The cherry is usually

propagated by budding the desired variety on Mazzard or Mahaleb stocks. Mazzard stocks are now counted best for both the sweet and sour cherries; but, because buds take more readily on the Mahaleb, this is extensively used as a stock for the sour cherries. Cherries prefer a well-drained gravelly loam, well enriched with plant food. Sour cherries require more moisture and will grow on heavier land than sweet cherries, but they will not tolerate a wet location. The fruit is grown commercially in Europe and the United States. In the eastern United States the sour cherries form an important item in the canning business, while on the Pacific coast the sweet-cherry industry reaches its highest development. The fruit of the cherry is much valued as an article of food. It is extensively used for dessert, pies, puddings, wines, etc. In 1909 the yield of cherries in the United States was 4,126,099 bushels, valued at $7,231,160. It ripens in Norway as far north as lat. 63°. In some parts of Germany the public roads are lined for many miles together with avenues of cherry trees. The wild black cherry (*Prunus serotina*) is a splendid timber tree, the wood being highly prized for finishing and furniture, while the bark is used in medicine and the fruit is used for making brandy.

Cherry Diseases. The cherry is subject to a number of fungus diseases, most of which are also common to other fruits, as brown rot (see PEACH), leaf spot (see PLUM), and black knot (see PLUM). A common disease of the cherry, known as mildew, is caused by the fungus *Podosphæra oxyacanthæ*, which is found upon the apple also, especially upon nursery stock. The affected leaves are gray with the fungus, and they soon dry and fall from the tree. Ammoniacal copper carbonate has been found a very efficient fungicide for preventing it. Leaf curl, due to the fungus *Exoascus cerasi*, and scab (*Cladosporium carpophilum*), are rather common diseases, but they usually yield to spraying. There is a very common leaf scorch in Europe, due to *Gnomonia erythrostoma*, that has not yet appeared in America. When attacked by this disease, the leaves wither suddenly, but remain on the trees all winter. The fruit ripens unevenly, cracks, and rots. In Germany relief was secured by collecting and burning all the leaves for two seasons. To be successful, this would have to be practiced over a considerable area, as the winds can spread the disease to quite a distance.

CHERRY BIRD, or **CEDAR BIRD.** See WAXWING.

CHERRY LAUREL, or LAUREL CHERRY. A popular name for certain evergreen species of the genus *Prunus*. They bear racemes of small, usually white, flowers and small nauseous fruits, the kernels of which somewhat resemble in flavor the kernels of almonds. The kernels and leaves of the cherry laurel are poisonous, although they are used to some extent for flavoring purposes. The leaves particularly are rich in the oil of bitter almonds, which is obtained by aqueous maceration and distillation. The product is known as cherry-laurel water and was formerly used in medicine. The common or English cherry laurel (*Prunus laurocerasus*), to which the foregoing remarks chiefly apply, is a native of southeastern Europe and adjacent Asia. It is a shrub which sometimes attains a height of 10 feet and which bears ovate-lanceolate, convex, smooth, shining, yellowish-green leaves and rather short terminal racemes. In Europe it is one of the most popular ornamental shrubs. It is rarely met with in the northern United States except in greenhouses; but in California and in the States south of Virginia it is becoming fairly common. Another European species is the Portugal cherry laurel (*Prunus lusitanica*), which often reaches a height of 20 feet. It does not grow so well in the shade as the other species. The wild orange (*Prunus caroliniana*), termed in the South the mock orange, is the best-known American representative of the cherry laurels. It is prized for ornamental planting because of its shining, dark-green leaves and short racemes of cream-colored flowers which appear in March.

CHER'RYVALE. A city in Montgomery Co., Kans., 156 miles south-southwest of Kansas City, on the Atchison, Topeka, and Santa Fe, and the St. Louis and San Francisco railroads (Map: Kansas, G 8). It contains a Carnegie library and a park. The principal industries are zinc smelting, brickmaking, oil refining, and the manufacture of glass. There are also ironworks and deposits of oil and gas. Cherryvale was settled in 1870 and was incorporated in 1879. The city has adopted the commission form of government. It owns its water works. Pop., 1900, 3472; 1910, 4304.

CHERRY VALLEY. A village in Otsego Co., N. Y., 68 miles west of Albany, on the Delaware and Hudson Railroad (Map: New York, F 3). Pop., in 1900, 772; in 1905, 746; in 1910, 792. It was the scene of a massacre during the Revolutionary War, 600 Indians under Joseph Brant and 200 Tories and English under Walter Butler attacking it on Nov. 11, 1778, killing 16 of the small garrison stationed here and 30 of the inhabitants, including women and children, burning nearly all the buildings, and carrying off 71 prisoners, whom they treated with great cruelty. Consult Halsey, *The Old New York Frontier* (New York, 1901).

CHERSIPHRON, kĕr'sĭ-frŏn (Lat., from Gk. Χερσίφρων). A famous Cretan architect, born at Cnossus. He planned, and in part constructed, the older temple of Artemis at Ephesus, being assisted in the work by his son Matagenes. He died, apparently, before the completion of the sculpture of the columns—i.e., before 546 B.C.

CHERSO, kĕr'sō. A long, narrow island of Austria, in the Adriatic, 12 miles south-southwest of Fiume (Map: Austria, D 4). It has an area of about 105 square miles. Its surface is generally hilly and rugged, with forests in the north. The vine and olive are cultivated to some extent. Vrana Lake, in the centre of the island, 40 feet above sea level, has no visible inlet or outlet, but is fed with water from the mainland by subterranean and submarine channels. Administratively it belongs to the District of Lussin, Istria. Its inhabitants are chiefly engaged in maritime industries. Its population, principally Serbo-Croat, was 8803 in 1900, including over 3000 Italians, and 10,200 in 1910. The chief town, Cherso, on the west coast, had in 1900 a population of about 5000.

CHERSON, kĕr-sōn'. See KHERSON.

CHERSONESUS, kĕr'sō-nē'sŭs (Lat., from Gk. Χερσόνησος, from *χέρσος, chersos*, dry land + *νῆσος, nēsos, island*, land island, i.e., peninsula). A name applied by the ancient Greeks to several peninsulas and promontories. Three of the most frequently mentioned are: (1) the Thracian Chersonese, northwest of the Hellespont (see THRACE; GALLIPOLI, PENINSULA OF); (2) the

Tauric Chersonese, in the Black Sea, the modern Crimea; and (3) the Cimbrian Chersonese, the modern Jutland.

CHERT, chĕrt (akin to Ir. *ceart*, pebble, Welsh *careg*, stone, Gael. *carr*, shelf of rock). An amorphous mineral substance, composed of a mixture of hydrated and anhydrous silica, which has the hardness of quartz and a splintery or conchoidal fracture. The color varies from white to black, but is commonly a neutral gray or brown. Chert is commonly associated with carbonate rocks, particularly limestone, where it forms nodules and irregular masses within the rock matrix, and is believed to be due partly to chemical deposition from water at the time of the deposition of the carbonate rocks, and perhaps in part to a concentration or segregation of the siliceous impurities subsequent to the formation of such rocks. Chert was formerly called "hornstone." See QUARTZ; SILICEOUS ROCKS.

CHERTKOV, VLADIMIR. See TCHERTKOV.

CHERTSY, chĕrt'sĭ, *colloq.*, chĕs'ĭ (AS. *Ceortes ēg*, Ceort's island). A market town of Surrey, England, on the Thames, 22 miles west-southwest of London (Map: England, F 5). It is irregularly built and is surrounded by villas. The chief trade is in malt and flour. Many vegetables are raised for the London market. Pop., 1901, 12,760; 1911, 13,816. Chertsey arose from a Benedictine monastery founded in 666 and rebuilt in 964 by Edgar. Charles James Fox lived on St. Anne's Hill, about a mile from the town, and the poet Cowley lived and died here.

CHER'UB (LL., Heb. *Kerub*, pl. *Kerubim*, Eng. pl. cherubim, or cherubs). The Hebrew name for a winged creature which is represented as in attendance upon Yahwe, and as belonging to the court of heavenly beings around his throne. In Babylonian inscriptions found at Susa the colossal winged bulls are called *karibati* (Zimmern, in Gesenius, *Hebraisches Worterbuch*, 14th ed.), and the Semitic root *karab*, 'to plow' (Neo-Heb., Aram., Ar.), suggests that *karib*, or *karub*, may be an early name for "ox," attaching itself as a technical term to the figure of a bull symbolizing the protecting genius of a shrine or palace. It is probable that already in Babylonian and Assyrian thought the hurrying storm cloud in the sky corresponded to this representation on earth of the swift messenger and carrier of a celestial divinity. Whether the term applied to other winged monsters, combining features of man, beast, and bird, cannot yet be determined. Cherubim are spoken of in Gen. iii. 24 as guarding the way to the tree of life. In addition to the cherubs "the flame of the turning sword" is mentioned, probably suggesting the presence of a seraph. Some scholars hold that two classes of heavenly beings, cherubim and seraphim, are referred to; others think of clouds and lightnings. The author may have had the natural phenomena in mind as manifestations of the presence of the protecting spirits. According to Ex. xxv. 18–22; xxxvi. 7–9, there were two cherubs made of gold on top of the covering of the ark (see ARK OF THE COVENANT), and pictures of cherubs were woven into the veil and elsewhere (Ex. xxvi. 31; xxxvi. 35). There is no intimation as to the form or size of these cherubs. We do not even know whether they were winged bulls, as is perhaps most probable, or winged men. In the innermost sanctuary of Solomon's temple there were also two cherubs, but they were each 10 cubits high, with wings 5 cubits in length, and were made of olive wood overlaid with gold; and there were carved cherubs, palm trees, and open flowers on all the walls of the house (1 Kings vi. 23–30). Again we have no information concerning the body of the cherubs, and cannot be sure, therefore, that they were winged bulls, though the prominence of the ox symbol, e.g., under the brazen sea, renders this very probable. In Ps. xviii. 11, it is said of Yahwe, "he rode on the cherub and did fly." Here the storm cloud seems to be represented as Yahwe's celestial carrier, his animal on which he rides, probably the bull. In Ezek. i, four cherubs, represented as animals with the legs and feet of oxen, two pairs of wings, and different faces—one that of a man, another that of a lion, another that of an ox, and another that of an eagle—carry the vault of heaven on which rests the throne of Yahwe. It is generally recognized that the text has suffered much in transmission; a later hand seems to have given four heads to each of the cherubs. (Consult Winckler, *Altorientalische Forschungen*, 1896, vol. iv, pp. 347 ff.) In Ezek. x. 14, the original text also appears to have assigned only one face to each cherub, but, characteristically enough, substitutes for "the face of an ox" "the face of the cherub"; in xxviii. 14, Yahwe says to the Prince of Tyre, "Thou wast with the cherub, I set thee in the holy mountain of the gods," and verse 16: "The cherub cast thee out of the midst of the stones of fire." The author of Ezek. xl.–xlviii. has no ark in his temple and therefore no free standing figures of cherubs; but alternate cherubs and palm trees are carved on the walls (xli. 18–20, 25), the former with two faces—one of a man and one of a lion. As a reason for this alternation of cherubs and palm trees, it has been suggested that the cherubs were perhaps thought of as winds carrying pollen; the relation of guardian to a sacred tree is also obvious. Not essentially different from Ezekiel's view is that found in Rev. iv. 6 ff. Four cherubs covered with eyes surround the throne of God; the first has the face of a lion, the second that of an ox, the third that of a man, and the fourth that of an eagle; but they have six wings, and not four. This gave rise at an early period of the Church to the symbolical figures of the four evangelists—the human countenance being associated with Matthew, that of the lion with Mark, that of the ox with Luke, and that of the eagle with John. In the developed system of Hebrew angelology the cherubs form one of the 10 highest classes of angels. They are mentioned in Eth. Enoch, xiv. 11, 18; in xx. 7, Gabriel is said to be "over paradise, the serpents, and the cherubim." Cherubim, seraphim, and ophannim (wheels) are mentioned in the Parables of Enoch (Eth. Enoch lxi. 10). Slavonic Enoch represents the cherubs as living in the sixth and seventh heavens (xix. 6; xx. 1). Their function becomes more and more that of offering praise to the Most High. Dwelling so near to the source of all knowledge, they also become examples of most perfect knowledge. This is emphasized already by Philo and then by many Christian teachers. In the hierarchical gradations established by these theologians the cherubim rank next to the seraphim as the second order of angels. Consult Barton, *Semitic Origins*, pp. 90 ff. (1903); Zimmern, in the 3d ed. of Schrader, *Die Keilinschriften und das Alte Testament*, pp. 631 ff. (1902); Bousset, *Die Religion des Judentums*, pp. 320 f.

(1903); Driver, *Genesis*, pp. 60 f. (1904); Dibelius, *Die Lade Jahves* (1906); Benzinger, *Hebraische Archäologie*, pp. 221 al. (1907); Pinches, *The Old Testament in the Light of the Historical Records of Assyrians and Babylonians*, pp. 80–82, 533 (1908); Gunkel, *Genesis*, pp. 24 f. (3d ed., 1910); Moss, "Cherubim," in Hastings, *Encyclopædia of Religion and Ethics*, iii (1911).

CHÉRUBIN. An opera by Massenet (q.v.), first produced in Monte Carlo, Feb. 14, 1905.

CHERUBINI, kā'rōō-bē'nē, MARIA LUIGI CARLO ZENOBIO SALVATORE (1760–1842). An Italian composer. He was born in Florence and began to study music at the age of six, under his father, a musician in the Pergola Theatre, and composition when nine years of age, under the brothers Felici and Bizarri and Castrucci. His earliest work was a Mass and Credo in D, and by 1776 his list included a Te Deum and an oratorio. Granted an allowance by the Grand Duke, he went to Bologna in 1778, spending there and in Milan four years under Sarti, from whom he acquired his remarkable knowledge of counterpoint and fugue. In 1780 his first opera, *Quinto Fabio*, was produced and was followed quickly by other dramatic works. In 1784 he went to London and held the post of composer to the King for one year. Here two operas, *La finta principessa* and *Giulio Sabino*, were brought out. In 1785 he visited Paris, and later Turin, and produced *Ifigenia in Aulide* (1787), returning in 1788 to make Paris his home. *Démophon* (1788) indicated that he was adopting a new style, and *Lodoiska* (1791) proved that he had abandoned the light Neapolitan style of his earlier works. Among later operas were: *Elisa* (1794); *Médée* (1797); *L'Hôtellerie portugaise* (1798); *Les deux journées*, in German called *Der Wasserträger*, and considered his operatic masterpiece (1800); and *Anacréon* (1803).

In 1795 Cherubini was appointed one of the *inspecteurs des études* in the new Conservatory of Music. In 1805 he went to Vienna to write an opera for the Imperial Opera House. Here he made the acquaintance of Haydn and Beethoven, both of whom considered the opera *Faniska* (1806) a masterpiece. He returned to France, but finding little favor with Napoleon went to the estate of the Prince de Chimay to recuperate. At the latter's request he wrote a church composition, the famous Mass in F (1809), and after that date wrote almost exclusively sacred music. In 1814 he was made a knight of the Legion of Honor by Louis XVIII. In 1815 Cherubini visited London, where he composed a symphony and overtures for the Philharmonic Society. In 1816 he was appointed, with Lesueur, musician and superintendent of the King's chapel, and in 1821–41 he was director of the Paris Conservatory, which he advanced to the high standard it still preserves. Cherubini has been called "the link between classic idealism and modern romanticism." "His sacred compositions, notably the requiems in C and D (1817 and 1836), are distinguished by a severe grandeur, and his dramatic work by brilliant and original instrumental effects." His work on counterpoint (1835) is still a standard. It was revised in 1896 by G. Jensen. For his life, consult: Berlioz, *Mémoires* (Paris, 1878); E. Bellasis, *Memorials of Cherubini* (London, 1905), with catalogue of compositions; Crowest, *Cherubini* (London and New York, 1890); M. E. Wittmann, *Cherubini* (Leipzig, 1895).

CHÉRUEL, shā'rȳ'ĕl', PIERRE ADOLPHE (1809–91). A French historian. He was born in Rouen, was educated at the Ecole Normale of Paris, became an instructor there in 1849, and in 1866 was appointed inspector general of public education and rector of the Academy of Strassburg. From 1870 to 1874 he was rector of the Poitiers Academy. He wrote a number of accurate, thorough, and readable works, including the *Dictionnaire historique des institutions, mœurs et coutumes de la France* (2 vols., 1855; 6th ed., 1884), the *Histoire de France sous le ministère de Mazarin* (3 vols., 1882–83), and a masterly edition of Saint-Simon (1856–58; 2d ed., 1878–81) and two studies of the Duc de Saint-Simon (1865, 1876). His earliest work was on the history of Rouen.

CHERUSCI, kĕ-rŭs'sī. A German tribe, first mentioned by Cæsar. They dwelt in the region of the Weser, their country lying to the northeast of that of the Chatti (q.v.). They are chiefly memorable in connection with their great leader, Arminius. After the death of Arminius internal strifes broke out among the Cherusci, and Tacitus says that they were subjugated by the Chatti. Notwithstanding this, they again appear as the chief tribe in the military league of the Saxons about the end of the third century. In the beginning of the fourth century they are included among the peoples who had leagued against Constantine and towards the close of the same century are still mentioned distinctively by Claudian.

CHER'VIL (AS. *cerfille*, Ger. *Kerbel*, from Lat. *cærefolium*, from Gk. χαιρέφυλλον, *chairephyllon*, from χαίρειν, *chairein*, to rejoice + φύλλον, *phyllon*, leaf) (*Anthriscus cerefolium*). An umbelliferous plant which has long been cultivated as a potherb, used in soups and for a garnish, in the same manner as parsley. It is much more used in some parts of the continent of Europe than in Great Britain or in the United States. It is a native of Europe, naturalized in some parts of England and in a few localities in the United States. The leaves have a peculiar, somewhat sweetish, pleasantly aromatic smell and taste, by which the plant may be known from its congener *Anthriscus vulgaris*, a weed whose leaves have a disagreeable smell and which is also distinguished by its hispid fruit. The umbelliferous plant called Venus's comb, or shepherd's-needle (*Scandix pecten-veneris*), a native of Europe, often found in grainfields and remarkable for the appearance and large size of its fruit, and another species, *Scandix australis*, which grows in the south of Europe, have a taste and smell resembling chervil and are used in the same way on the Continent. Sweet chervil, or sweet cicely (*Myrrhis odorata*, the *Scandix odorata* of the older botanists), a native of the south of Europe and of some parts of Asia, common in the neighborhood of houses in Great Britain, although probably not a true native, is frequently cultivated in Germany under the name of Spanish chervil, or anise chervil. In Scotland the plant is commonly called myrrh by the peasantry. Its smell is peculiarly attractive to bees, and the insides of empty hives are sometimes rubbed with its leaves, to induce swarms to enter. *Chærophyllum bulbosum*, of southern Europe, sometimes called "turnip-rooted chervil," is cultivated for the sake of its carrot-shaped roots, which are used in the same manner as carrots. The seed is said to lose its vitality quickly and

should be stratified or sown in the fall soon after ripening. The quality of the root is said to be improved by keeping.

CHERVILLE, shĕr'vĕl', GASPARD GEORGES PESCOW, MARQUIS DE (1821–98). A French author. He was born in Chartres and for some time collaborated with the elder Dumas. Subsequently he became known as a writer on the chase, angling, and animal life, his works including: *Les aventures d'un chien-de-chasse* (1862; 2d ed., 1882); *Histoire d'un trop bon chien* (1867; an illustrated ed., 1884); *Les éléphants* (1895).

CHERWELL, chär'wĕl. A stream which falls into the Isis, or Thames, near Oxford, England. It rises in the southwest of Northamptonshire and forms the western boundary of Oxfordshire for a considerable distance (Map: England, E 5).

CHESAPEAKE, chĕs'ȧ-pēk, THE. A 38-gun vessel famous in the history of the American navy. Early in 1807, after undergoing partial repairs in the Washington Navy Yard, she proceeded to Hampton Roads, where Commodore James Barron (q.v.) assumed command. On June 22, poorly equipped, insufficiently manned by an untrained crew, and wholly unfit for immediate action, she started across the Atlantic on a training cruise; but when well out to sea was overtaken and stopped by the British frigate *Leopard*, 50 guns, whose commander demanded the restitution of British deserters alleged to form a part of the *Chesapeake's* crew. On Barron's refusal to return the sailors demanded, or to permit search for them the British attacked with vigor, soon killing 3 and wounding 18 of the Americans and seriously crippling their vessel. From the *Chesapeake* only one gun was fired, and that with great difficulty and without effect. Barron finally struck his colors, and the British reclaimed four deserters, three of whom, though they had been formerly impressed into the British service, were native-born Americans. The affair caused intense excitement throughout the United States, anti-British feeling ran high, and the people everywhere demanded "reparation or war." President Jefferson immediately (July 2) issued a proclamation, which proved futile, ordering British cruisers to depart from American ports and forbidding all aid and intercourse with them; and, through Monroe, indignantly demanded redress, but without avail, from the British government. The incident was one of the chief occurrences that led up to the War of 1812 and is famous in American history as "The *Chesapeake* Affair," or "The *Chesapeake* Outrage." On June 1, 1813, the *Chesapeake*, then commanded by Captain Lawrence and carrying 50 guns, fought a battle in Massachusetts Bay with the British 38-gun vessel the *Shannon*, Captain Broke, then carrying 52 guns. The two vessels were almost evenly matched, except that the *Chesapeake* had an untrained crew and had only recently changed captains. After an engagement lasting fifteen minutes the *Chesapeake*, rendered unmanageable by the terrible fire of the *Shannon*, was forced to surrender after Captain Lawrence had received a mortal wound. This gallant commander exhorted his men to the end with the words, "Don't give up the ship!" Out of a crew of 379, the *Chesapeake* lost 61 killed or mortally wounded and 85 severely and slightly wounded; while out of a crew of 330, the *Shannon* lost 33 killed and 50 wounded. The *Chesapeake* was taken as a prize to Halifax, was afterward used as a British war vessel, and in 1820 was sold as old timber. Consult: Henry Adams, *History of the United States*, vol. iv (9 vols., New York, 1889–91); McMaster, *History of the People of the United States*, vols. iii and iv (New York, 1883–1900); Cooper, *History of the Navy of the United States* (2 vols., London, 1839); Roosevelt, *The Naval War of 1812* (New York, 1882); Barnes, *Naval Actions of the War of 1812* (New York, 1896).

CHES'APEAKE BAY (Algonquian *K'chesepi-ack*, country on a great river). The largest inlet on the Atlantic coast of the United States (Map: United States, L 3; Maryland, M 5). It penetrates Virginia and Maryland and is 200 miles long, having a maximum width of nearly 40 miles, but an average width of less than 20 miles. Its entrance, 12 miles wide, has on the north Cape Charles (q.v.) and on the south Cape Henry (q.v.). This bay has numerous arms, many of which are the estuaries of navigable rivers, such as the Susquehanna, Gunpowder, Patapsco, Patuxent, Potomac, Rappahannock, York, and James rivers on the west shore, and the Elk, Chester, Choptank, Nanticoke, and Pocomoke rivers on the east shore. Unlike the shallow sounds in North and South Carolina, this network of gulfs and estuaries, with an average depth of from 30 to 60 feet, affords navigation for the largest vessels. In consequence, Baltimore and Norfolk are extensive shipping ports, the latter being a naval base. Chesapeake Bay is noted for its extensive oyster beds, and the vast numbers of waterfowl which frequent its waters. The shore lands of the bay produce a great amount of garden stuff, which is sent to Baltimore and the Northern markets. Chesapeake Bay is connected with Delaware Bay by canal.

CHESAPEAKE BAY DOG. See FIELD DOG.

CHESAPEAKE FORMATION. The geological designation for an assemblage of sands, clays, and marls that outcrops within the Atlantic coastal plain of the United States and that comprises the entire Miocene series of that region. It is exposed as a broad continuous belt from northern New Jersey to North Carolina, but farther south appears in disconnected areas which continue as far as northern Florida. The famous Gay Head cliffs of Martha's Vineyard represent a northern outlier of the main belt. The formation has a thickness of 700 feet in New Jersey and 400 feet in Maryland. In the latter State, as well as in Virginia, it contains deposits of diatomaceous earth which have considerable economic importance. See TERTIARY SYSTEM.

CHESELDEN, chĕs'el-den, WILLIAM (1688–1752). An English surgeon and anatomist, born at Somerby, Leicestershire. He commenced his medical studies in 1703, established himself as a lecturer on anatomy in 1711, and in the following year was elected a fellow of the Royal Society. In 1718 he was appointed surgeon to St. Thomas's, St. George's, and Westminster hospitals, where he acquired a great reputation for his "lateral operation for the stone." His principal works are: *Anatomy of the Human Body* (1713), long a textbook on the subject in England; a *Treatise on the High Operation for the Stone* (1723); and *Osteology, or Anatomy of the Bones* (1733).

CHESHIRE, chĕsh'ĕr (for *Chestershire*, from *Chester*, the capital of the county + *shire*). A

maritime county in the west of England, bounded north by the river Mersey and partly by the Irish Sea (Map: England, D 3). Its area is 1027 square miles. The surface forms an extensive, nearly level plain between the Derbyshire and Welsh mountains, chiefly occupied by grazing and dairy tracts, which are among the most important in England. Dairy farming and cheese making are the principal agricultural industries. Cheshire is also an important manufacturing county. The chief mineral products are rock salt and coal. The chief towns are Chester (the county town), Macclesfield, Stockport, Congleton, Knutsford, and Birkenhead. Pop., 1901, 593,885; 1911, 676,356.

CHESHIRE, JOSEPH BLOUNT (1850–). An American Protestant Episcopal clergyman, Bishop of North Carolina. He was born at Tarboro, N. C., graduated at Trinity College (Hartford, Conn.) in 1869, and practiced law from 1872 to 1878. He was ordained priest in 1880, was consecrated Bishop Coadjutor in 1893, and Bishop in the same year. His publications include *The Early Conventions of the Episcopal Church in North Carolina* (1882) and various pamphlets and addresses. He has edited *Sketches of Church History in North Carolina* (1892) and wrote a *History of the Protestant Episcopal Church in the Confederate States* (1911).

CHESHIRE CHEESE. See CHEESE; CHEESE MAKING.

CHESHUNT, chĕs'nt. A town of Hertfordshire, England, on the Lea, about 7 miles south of Hertford and 14 miles north of London (Map: England, F 5). The Cheshunt (theological) College, established here in 1792, was removed to Cambridge in 1905. Pop., 1901, 12,300; 1911, 12,954. Consult *Cheshunt College* (London, 1868).

CHESLEY, MARY RUSSELL (1847–). A Canadian social reformer, born and educated at Dartmouth, Nova Scotia. She early became interested in matters of social reform, especially the legal prohibition of the liquor traffic; and was elected president of the Women's Christian Temperance Union. That body about 1891 petitioned the Nova Scotia Legislature for the political enfranchisement of women, and the refusal of the petition caused Miss Chesley to become an active supporter of the movement. To the address of James Wilberforce Longley (q.v.), then Attorney-General of Nova Scotia, against a bill for woman suffrage which had been introduced in the Legislature, she made a notable reply. Her publications include *The Mission of Women* (1895), *The Delusion of Militarism* (1909), and papers on the subject of woman suffrage.

CHESNEY, chĕs'nĭ, CHARLES CORNWALLIS (1826–76). A British military engineer and writer. He was a brevet colonel in the British Royal Engineers, and for many years was professor of military history at the Staff College at Sandhurst. He first attracted general attention by *A Military View of Recent Campaigns in Virginia and Maryland* (1863) and in 1868 published his *Waterloo Lectures*, perhaps his ablest work. He also published *The Military Resources of Prussia and France* (1870) and *Essays in Modern Military Biography* (1874). The latter contains valuable critical estimates of the military careers of Generals U. S. Grant and R. E. Lee and of "Chinese" Gordon.

CHESNEY, FRANCIS RAWDON (1789–1872). A British soldier and explorer, was born at Annalong, County of Down, Ireland. In 1829 he inspected the route of the Suez Canal and proved the undertaking to be feasible, so that De Lesseps 40 years afterward styled him the "Father of the Suez Canal." He is especially known, however, as the explorer of the Euphrates, and the founder of the overland route to India by way of that river. He wrote *Expedition for the Survey of the Euphrates and Tigris* (1850) and *Narrative of the Euphrates Expedition* (1868). Consult his *Life*, by his wife and daughter, ed. by Stanley Lane-Poole (London, 1885).

CHESNIUS. See DUCHESNE.

CHESNUT, VICTOR KING (1867–). An American chemist and botanist, born at Nevada City, Cal. He was educated at the University of California, where in 1890–93 he was assistant in chemistry. From 1894 to 1904 he served as assistant botanist, having charge of poisonous-plant investigations, in the Bureau of Plant Industry, United States Department of Agriculture. For the following three years he was chemist of the Montana Experiment Station. In 1907 he became assistant chemist in the Division of Drugs, Bureau of Chemistry, United States Department of Agriculture. His publications include: *Principal Poisonous Plants of the United States* (1898); *Preliminary Catalogue of Plants Poisonous to Stock* (1898); *Plants Used by the Indians of Mendocino County, California* (1902).

CHESS (OF. *esches*, Fr. pl. *échecs*, from It. *scacchi*, ML. *scacci*, from Pers. *shāh*, king). The origin of this, the most intellectual of all games of skill, has been much disputed; but it is safe to say that under the Sanskrit name of *chaturanga*, consisting of four members, a game essentially the same as modern chess was played in Hindustan in very remote ages. Marked traces of its early Asiatic origin may still be discerned in its nomenclature and other characteristics. From Hindustan chess spread into Persia and thence into Arabia. The Arabs, it would appear, introduced it into Spain in the eighth century, though it may have been imported still earlier into Constantinople and probably some other cities of eastern Europe. An interesting reference to it occurs in the French poem of "Huon de Bordeaux" (c.1450), which supplied Shakespeare with some of the *dramatis personæ* of his *Midsummer Night's Dream*. This connection is especially noteworthy because of the probability that it also suggested to him the introduction of Ferdinand and Miranda playing at chess in the *Tempest*, although it is likely that he was acquainted with the fact that during his own lifetime Naples, the country of Ferdinand, was the centre of European chess playing, and skill in the game temporarily reached a height which it never attained again until the middle of the eighteenth century, when Philidor (F. A. Danican) became famous all over Europe.

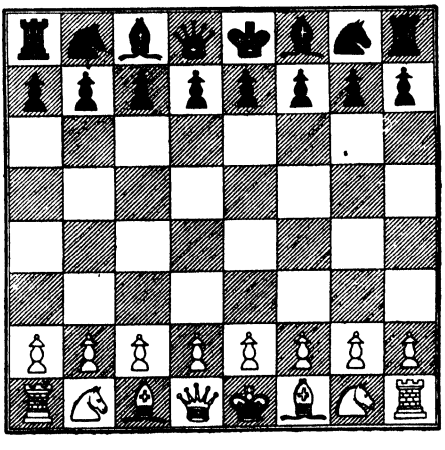
Benjamin Franklin was the first American to bring the game into prominence, both as a player and a writer; but its practice was confined to a few until the early part of the nineteenth century. By 1857 there were sufficient chess clubs to justify a national congress, at which Paul Morphy of New Orleans won the championship. He was such a phenomenal player that next year he was sent to Europe, and there he carried off all the honors. From that time chess has had a settled place among our pas-

times, and Americans, in all the phases of the game, in international contests have held a high place.

The original Hindu game was played on a board of 64 squares, as now, but by *four persons*, two being allied against two, as in whist. Hence the name *chaturanga*, from *chatur*, 'four,' and *anga*, 'a member,' or 'component part.' The name *shatranj*, used by the Persians and Arabs, is a corruption of the Sanskrit. The English, French, and other European names are derived from the Persian term *shah*, 'king.' *Check*, the warning when the king is in danger, is but another form of *shah;* in fact, "king" is sometimes used for "check," and in German *schach* is both the name of the game and the term of warning. The term *rook* is from the Sanskrit *roka*, Persian *rukh*, meaning a 'ship' or 'chariot'; *pawn* is said to be from *peon*, an 'attendant' or 'foot soldier.'

The chessboard is marked out into 64 square divisions, which are colored alternately black and white, in order the more clearly to determine and denote the respective movements of the several pieces. In placing the 32 pieces with which the game is played upon the board, each player must always have a *white* corner square at his right hand. There are two sets of pieces, of opposite colors, of 16 men each, and of various powers according to their rank. These sets of men are arrayed opposite to each other and attack, defend, and capture, like hostile armies. The accompanying diagram will best explain the name, form, and place of each man at the commencement of the game.

BLACK.



Rook. Knight. Bishop. Queen. King. Bishop. Knight. Rook.

WHITE.

The superior officers occupying the first row on each side are called *pieces;* the inferior men, all alike, standing on the row immediately in front of the pieces, are called *pawns*. Their moves and powers, along with the peculiar terms used in chess, may be briefly described as follows:

A *pawn*, at his *first* move, may advance either one or two squares straight forward: but after having once moved, he can advance only a single square at a time. In capturing an adverse piece, however, a pawn moves one square diagonally, either right or left; but the pawn never moves backward. On arriving at an eighth square, or the extreme line of the board, a pawn may be exchanged for any piece his owner chooses to call for, except a king, so that a player may have several queens on the board at once. If, on moving two squares, a pawn pass by an adverse pawn which has arrived at the fifth line, the advanced adverse pawn may take the other *in passing* in exactly the same manner as if the latter had moved but one square.

A bishop moves any number of squares diagonally, but diagonally only; therefore a bishop can never change the color of his square.

A knight moves two squares, so as always to change color—i.e., one square forward, backward, or sidewise, and one diagonally. On account of this crooked movement he can leap over or between any surrounding pieces; and therefore a knight's check, unless he can be taken, always compels the king to move.

The rook, or castle, moves any number of squares forward, backward, or sidewise, but not diagonally.

The queen is by far the most powerful of the pieces and moves over any number of squares, either in straight lines or diagonals, forward, backward, or sidewise; so that her action is a union of that of the rook and bishop. At starting the queen always stands on a square of her own color.

The king is the most important piece on the board, as the game depends upon his safety. He moves only one square at once, in any direction, except when he *castles*—a term to be explained presently. The king cannot be taken; but when any other piece attacks him, he is said to be in *check* and must either move out of check or interpose some one of his subjects, unless the checking piece can be captured. When there is no means of rescuing the king from check, he is said to be checkmated, and the game is over. Of course, the two kings can never meet, as they would be in check to each other. *Double check* is when a piece, by being moved, not only gives check itself, but also discovers a previously masked attack from another.

Castling is a privilege allowed to the king once in a game. The move is performed either with the king's rook or queen's rook; in the former case the king is moved to the king's knight's square, and the king's rook is placed on the king's bishop's square; in the latter case the king is played to the queen's bishop's square, and the queen's rook played to the queen's square. But the king cannot castle after having once moved, nor at a moment when he is actually in check, nor with a rook that has moved, nor when he passes over a square attacked or checked by an adverse piece, nor when any piece stands between him and the rook with which he would castle, nor when in the act of castling either the king or rook would have to capture an adverse piece.

A *drawn* game results from neither player being able to checkmate the other; thus, a king left alone on each side must of course produce a draw, as does also a king with a bishop, or a knight, against a king.

Stalemate, or the not being able to move either the king or any other piece, also constitutes a drawn game.

Odds is a term applied to the advantage which a stronger player should give to a weaker; thus, the removal of a rook or knight from the better player's forces may be fair odds; or, if the

players are more nearly matched, the one may give a pawn. When the odds of a pawn are given, it is always understood to be the king's bishop's pawn.

Gambit is a technical word implying the sacrifice of a pawn early in the game, for the purpose of taking up an attacking position with the pieces.

Supposing the worth of a pawn to be represented by unity, the following is a tolerable average estimate of the comparative value of the pieces: pawn, 1; bishop, 3; knight, 3; rook, 5; queen, 9.

The rows of squares running straight up and down the board are called *files*, those running from side to side are called *lines*, and those running obliquely across are termed *diagonals*.

The playing over the following short game will serve the learner as a little initiatory practice:

WHITE.	BLACK.
1. Pawn to K 4.	1. Pawn to K 4.
2. King's bishop to queen's bishop 4th.	2. King's Bishop to queen's bishop's 4th.
3. Queen to king's rook's 5th	3. King's knight to king's bishop's 3d.
4. Queen takes[1] king's bishop's pawn, giving black checkmate.	

[1] Taking is always performed by lifting the captured man from the board and placing the captor on his square. The pawn is the only man whose mode of taking differs from his ordinary move.

The foregoing brief mode of giving a checkmate is called the *scholar's mate* and is often practiced upon young and unwary players. Any contractions used, such as "K" for king, "B" for bishop, etc., will readily be understood by the use of the diagrams.

In the conduct of the game and in the practice of chess the following rules, precepts, and hints will be found very generally useful: Play forth your minor pieces early, and castle your king in good time. You may sometimes delay castling with advantage, but not often. Do not expect to be able to establish an enduring attack with half your forces at home. Seek to let your style of play be attacking, and remember the gaining or losing of time in your measures is the element of winning or losing the game. Never touch a piece without moving it, nor suffer yourself or your opponent to infringe any other of the laws of the game.

You will find, when first player, that the opening, springing from your playing first king's pawn two, and then your king's knight to the bishop's third, is one of the best that you can adopt; but do not adhere to any one opening only. If you wish to adopt a purely defensive opening, you may play Pawn to K 3, and follow up with Pawn to Q 4, and Pawn to Q B 4. Next to playing with good players, nothing will conduce to improvement more than looking on at two expert players while they play. Wanting these advantages, it is best to play over openings and actual games from books or journals. To prevent blunders and oversights, always endeavor to perceive the motive of your adversary's move before you play; and look often round the board to see that you are not losing sight of any better move than the one you intended, or that you are not suffering yourself to be tempted by a bait.

The most elaborate and complete code of rules is to be found in Staunton, *Chess Praxis* (London, 1860). In that code every law of the game is fully explained, filling 66 pages of the book. For the antiquities of the subject, consult Forbes, *History of Chess* (London, 1860). Modern practical works are: Morphy, *Games at Chess*, ed. by Lowenthal (New York, 1860); Staunton, *Chess: Theory and Practice* (London, 1876); Gossip, *Chess Player's Manual* (London, 1875); Morgan, *Chess Digest* (4 vols., Philadelphia, 1905).

CHESS, or **CHEAT.** A common name of the *Bromus secalinus*. See BROME GRASS.

CHEST (palatalization of AS. *cist, cest,* from Lat. *cista,* Gk. *κίστη, kistē,* chest, box), or THORAX. In anatomy, the part of the body between the neck and abdomen, constituting the uppermost of the two divisions of the trunk. It contains the heart and lungs and is bounded externally by the ribs. The chest is somewhat conical in form, the broad or lower end of the cone being closed by the diaphragm, a large muscular partition which projects upward from the lower ribs, being convex towards the chest and concave towards the abdomen. In respiration the diaphragm descends by its own muscular contraction, while at the same time the ribs are drawn upward and outward by the accessory muscles of inspiration. The cavity of the chest is thus enlarged, the lungs are expanded, and air is drawn into them through the trachea, or windpipe, and the bronchial tubes. The combination of bone, cartilage, muscle, and tendon entering into the composition of the chest is such as to permit of expansile movement to the extent required and yet to guard against overexpansion, which would be fatal to the delicate structures within. The bones of the chest are at the same time a powerful protection against external injury.

The structures forming the walls of the chest are: 1. The backbone, or spinal column, divided into 24 true vertebræ, 12 of which, called the "dorsal vertebræ," form the thoracic portion. 2. Twelve ribs on either side, attached behind to the dorsal vertebræ, and ending in front in the costal cartilages. 3. The sternum, or breastbone, which occupies the middle line in front, and to which the costal cartilages are attached on either side. 4. The diaphragm (q.v.). See also SKELETON.

The contents of the chest are the heart, the great arteries and veins, the lungs, the trachea, or windpipe, the bronchi, or branches of the trachea, leading to the lungs, the œsophagus, or gullet, certain important nerve trunks, and the thoracic duct, or general terminus of the lymphatic system of vessels, by which the chyle and lymph are discharged into the blood. The importance of these parts to life, and their great liability to deranged action, render the chest the seat of a large proportion of the diseases which afflict humanity, and especially of those which end in death. Of the three organs which Bichat called the "tripod of life" —viz., the brain, heart, and lungs—the chest contains two; hence its condition in almost all diseases, and especially in fatal diseases, is an object of the utmost solicitude to the physician.

The diseases of the chest depend in some cases on alterations in its form, as by rickets (q.v.) and other conditions affecting the bones in early childhood or in youth, or by too tight lacing in girls. The lungs are subject to a great variety of diseases, among which the principal are consumption, or pulmonary tuberculosis (q.v.), pneumonia (q.v.), pleurisy (q.v.), and bronchitis (q.v.). The heart is subject to pericarditis, endocarditis, enlargement (hyper-

trophy), dilatation, and degeneration of its muscular texture. The aorta is often affected with degeneration of its walls and occasionally with aneurism. The great veins are liable to overdistension and to obstruction by tumors or by coagulation of the contained blood. The thoracic duct is sometimes obstructed by external pressure, and the œsophagus has a number of diseases usually described in connection with the alimentary canal. Most of the diseases here referred to are described either in special articles or under HEART, DISEASES OF. See also AUSCULTATION; PERCUSSION.

CHEST, NAVAL. The name "chest" has been given to certain funds maintained for the benefit of seamen belonging to the English navy. A fund, called the *Chest at Chatham,* was suggested so long ago as the days of Drake and Hawkins for the relief of superannuated and wounded seamen. In 1590 all seafaring men in Queen Elizabeth's service consented to a stoppage out of their pay of two shillings to six shillings per month to support this fund. The money was not in those days, as it would be now, put out to interest; it was kept in a chest, and hence the name given to the fund itself. During the eighteenth century the system became organized in a better manner; but still the fund retained the name "chest," insomuch that when the office was removed from Chatham to Greenwich in 1803, it became the *Chest at Greenwich.* The chest is managed ex officio, and the accounts are annually laid before Parliament. Handsome gifts are occasionally made to the fund by individuals. Disabled sailors receive a present sum of money, if not deprived of the power of earning a living; but if their injuries are more permanent, they receive a pension from the Chest for one year or for several years or for life, paid half-yearly.

CHES'TER (AS. *ceaster,* from Lat. *castra,* camp). An ancient episcopal city, municipal and parliamentary borough, and river port, the capital of Cheshire, England, on the right bank of the Dee, 22 miles from its estuary, and 16 miles southeast of Liverpool (Map: England, D 3). It stands on a rocky sandstone height, the greater part being inclosed by ancient walls 7 or 8 feet thick, nearly 2 miles in circuit, pierced by four gates, and now forming a promenade from which excellent views of the city and vicinity are obtained. It is the only city in England that still has its walls intact. The two main streets cross at right angles and were cut out of the rock by the Romans 4 to 10 feet below the level of the houses. The houses in these streets are curiously arranged; the front parts of their second stories, as far back as 16 feet, form a continuous paved promenade or covered gallery, open in front, and reached by flights of steps from the street below, with private houses above, inferior shops and warehouses below, and the chief shops of the town within. These arcades, called the "Rows," together with the walls and the half-timbered construction of many of the houses, with ornamental gables of the sixteenth century, render Chester perhaps the most picturesque city in England. The cathedral is a massive structure of sandstone, with a tower of 127 feet. It was formerly the church of the Benedictine Abbey of St. Werburgh, which for 650 years was one of the richest in England. Charles Kingsley held his canonry in the cathedral of Chester. The cathedral grammar school was founded by Henry VIII. St. John's Church, long in ruins, but partially restored since 1868, is supposed to have been of early Saxon origin. Among other noted buildings are Cæsar's Tower, a remnant of the castle built by William the Conqueror, now used as barracks, the town hall, linen hall, and music hall. There are also many quaint private houses, such as God's Providence House, so called from the inscription on it; Bishop Lloyd's House, and Stanley House. The Dee is crossed by three bridges—an old stone one of seven arches, a suspension bridge, and Grosvenor Bridge, consisting of one superb stone arch of 200 feet span. Chester sends one member to Parliament. Many modern improvements have been made in the city, but with due regard to the quaint architectural features. Electric lighting has been installed; a modern sewerage system, including precipitation works, has been introduced; public baths, markets, a free library, a museum, and a hospital are maintained by the municipality. There are two public parks, and on the Roodee, outside the walls, there is a large race track. Chester has manufactures of lead, iron foundries, chemical works, and a shipbuilding yard. It manufactures boots and shoes for export. Its principal trade, however, is in cheese, for which it is a famous market. The improvement of the Dee is bringing back to Chester some of its former position as a port; there is an increasing importation of ores and timber and an export of manufactured iron. Chester is the terminus of several railway lines, and the union railway station is one of the finest in Great Britain. About 3½ miles from the city is Eaton Hall, the magnificent seat of the Duke of Westminster. Pop., 1891, 37,105; 1901, 38,309; 1911, 39,028.

Chester was the Deva of the Romans, the British Caer Lleonvawr, and the Saxon Legaceaster or Laegeceaster. It was devastated by Ethelfrid, King of Northumbria, early in the seventh century, after the massacre of 1200 monks of Bangor Yscoed, who had assembled to pray for the success of their compatriots. In 828 it was taken by the Saxons and in 894 by the Danes. Ethelred retook it in 904 and rebuilt the walls. From the Norman Conquest to the time of Henry III the earls of Chester had their own courts and parliaments at Chester, with eight subfeudatories and the superiors of the great religious houses, Chester being then a county palatine. Henry III made his eldest son Earl of Chester, a title held since by the Prince of Wales. In 1128 the town received its first charter. After a long siege (1643–46) the parliamentary forces took the city.

Bibliography. Howson, "Chester Cathedral," in *Cathedrals of England* (Philadelphia, 1895); Freeman, "Early History of Chester," in *Archæological Journal,* vol. xliii (London, 1886); Lach-Szyrma, "The Rows of Chester," Picton, "The Walls of Chester," Smith, "The Walls of Chester," in *Archæological Journal,* vol. xliv (ib., 1888).

CHESTER. A town and port of entry on Mahone Bay, Lunenburg Co., Nova Scotia, Canada, 34 miles (direct) south by west of Halifax, and on the Halifax and Southwestern Railroad (Map: Nova Scotia, E 4). The town was founded by New Englanders in 1760 and has manufacturing and fishing industries. Pop., 1910, 1096. The village of Chester Basin, 5 miles distant, is a popular summer resort.

CHESTER. A city and the county seat of Randolph Co., Ill., on the Mississippi River, 69

miles by rail south of St. Louis, and on the St. Louis, Iron Mountain, and Southern, the Illinois Southern, the Cape Girardeau and Northern, the St. Louis Southwestern, and the Wabash, Chester, and Western railroads (Map: Illinois, C 6). It has a public library, and contains the Southern Illinois Penitentiary and the Illinois Asylum for the Criminal Insane. The city carries on a considerable trade and has manufactures of flour, furniture, hose, shoes, knit goods, foundry products, wagons, etc. Pop., 1900, 2832; 1910, 2747.

CHESTER. A city in Delaware Co., Pa., 13 miles southwest of Philadelphia, on the Delaware River, and on the Baltimore and Ohio, the Pennsylvania, the Philadelphia and Reading, and the Southern Pennsylvania Traction Co. railroads (Map: Pennsylvania, K 8). It has two free libraries, two hospitals, a high school building, and three parks, and the Deshong Memorial grounds and art buildings; and is the seat of the Pennsylvania Military College. The Crozier Theological Seminary (Baptist) is at Upland, a part of Chester. Of historic interest are the city hall, built in 1724, and the house of William Penn. Chester has large manufactories of silk, cotton, and woolen goods, dyestuffs, steel castings, locomotives, boilers and engines, lumber, fire bricks, paper, cigars, plaster, boards, ice, etc.; and is noted for its former shipbuilding. Chester adopted the commission form of government in 1913. Pop., 1890, 20,226; 1900, 33,988; 1910, 38,537.

Chester, the oldest town in Pennsylvania, settled by Swedes in 1644, was called Upland until 1682, when Penn arrived and gave it its present name. It was laid out in 1700, was incorporated as a borough in 1701, and was chartered as a city in 1866. The first Pennsylvania Assembly convened here in 1682. During the Revolution it was alternately occupied by the British and the Americans, and after the battle of Brandywine, in 1777, Washington reassembled his troops here. Consult Ashmead, *Historical Sketch of Chester* (Chester, 1883).

CHESTER. A city and the county seat of Chester Co., S. C., 65 miles north by west of Columbia, on the Southern, the Seaboard Air Line, the Carolina and Northwestern, and the Lancaster and Chester railroads (Map: South Carolina, C 2). It is in a cotton-growing and agricultural country, and has cotton mills, cotton gins, a cottonseed-oil mill, flour and lumber mills, iron works, an ice plant, overall, fertilizer, and canning factories, and railway shops. The city contains also a public library, courthouse, and hospital, and owns its water works. Pop., 1900, 4075; 1910, 4754.

CHESTER, COLBY MITCHELL (1844–). An American naval officer. He was born in New London, Conn., graduated at the United States Naval Academy in 1863, and in 1864 participated in the operations against Mobile. Having held several important commands and risen in rank, he was commandant at Annapolis in 1891–94 and commander in chief of the South Atlantic squadron in 1897–98; commanded the *Cincinnati*, the flagship of the North Atlantic squadron, during the Spanish-American war; took command of the battleship *Kentucky* in 1900; became superintendent of the Naval Observatory in 1902, and was advanced to rear admiral in 1903. He was retired on Feb. 28, 1906.

CHESTER, GEORGE RANDOLPH (1869–). An American writer, born in Ohio. He left home at an early age and after engaging in various occupations began newspaper work as a reporter on the Detroit *News*. He was later connected with the Cincinnati *Enquirer*, of which he became Sunday editor. He began writing for newspaper syndicates and later for magazines, especially for the *Saturday Evening Post*, and became known as an author of popular appeal. Several of his stories have been dramatized and produced with success. His writings include: *Get-Rich-Quick Wallingford* (1908); *A Cash Intrigue* (1909); *The Making of Bobby Burnit* (1909); *The Art of Short-Story Writing* (1910); *The Jingo: A Tale of Red Roses* (1912); *Wallingford in his Prime* (1913).

CHESTER, JOSEPH LEMUEL (1821–82). An American antiquary. He was born in Norwich, Conn., and until 1852 was a merchant's clerk in Philadelphia. He was afterward clerk in the House of Representatives and aid-de-camp to the Governor of Pennsylvania. After 1858 he resided in London, where he spent 10 years in the compilation of an annotated abstract of the registers of Westminster Abbey (1876). This work was published by the Harleian Society, of which in 1869 he had been a founder. At the time of his death he was regarded as perhaps the most learned genealogist in England or America. He also published: *Greenwood Cemetery and Other Poems* (1843); *Educational Laws of Virginia* (1854); *John Rodgers, the Compiler of the First Authorized English Bible* (1861); *The Reiester Booke of Saynte De'nis Backchurch* (1878).

CHES'TERFIELD. A municipal borough and market town in Derbyshire, England, at the confluence of the Hipper and Rother, about 12 miles south of Sheffield (Map: England, E 3). There are manufactures of cotton, silk, earthenware, and machinery; the metals and minerals in the neighborhood include coal, iron, potters' and brick clay, slate, and lead. Trade is facilitated by a canal connecting Chesterfield with the Trent and by the main line of the Midland Railway. Owing to the rapid growth of its manufactures and the increase of its population, it has become a flourishing municipality. The electricity, gas, and water supplies are managed by a special board; tramways, parks, public baths, a cemetery, markets, and slaughterhouses are maintained by the municipality. It also operates its street railways. The town has an excellent system of sewerage and in connection therewith maintains a sewage farm. Its educational institutions include an ancient grammar school and technical school, and a public library maintained by the town. The town is of great antiquity. Its first charter was received in the reign of King John. George Stephenson is buried in Trinity Church. Pop., 1901, 27,200; 1911, 39,038. Consult Yeatman, *The Records of Chesterfield* (Chesterfield, 1884).

CHESTERFIELD, PHILIP DORMER STANHOPE, EARL OF (1694–1773). An English statesman and author, eldest son of the third Earl of Chesterfield. He was born in London, Sept. 22, 1694. He studied for about a year at Trinity Hall, Cambridge, and then left to travel in Flanders (1714). The next year he was appointed a gentleman of the bedchamber to the Prince of Wales and entered the House of Commons as a Whig. On the death of his father (1726) he succeeded to the earldom and

took his seat in the House of Lords. Two years later, he was appointed Ambassador to The Hague; in 1730 he was made a knight of the Garter and Lord Steward of the Household. Dismissed from office (1733), he became a bitter opponent of Walpole. Particularly brilliant was his speech against the Licensing Act (1737). In 1744 he joined the Pelham ministry, and in the next year was appointed Lord Lieutenant of Ireland, a post for which he was admirably qualified. In 1746 he became Secretary of State and was offered a dukedom. In 1748 he resigned office and passed the rest of his life in leisure. Distinguished for wit and graceful manners, he was for a time on terms of intimacy with Pope, Swift, Bolingbroke, and other eminent contemporaries. At an inopportune time he thrust himself forward as a patron of Dr. Johnson and was repudiated in a celebrated letter (Feb. 7, 1735). (See JOHNSON, SAMUEL.) Chesterfield's literary fame rests upon his *Letters* (published 1744) to his natural son, Philip Dormer, written for the improvement of his manners and inculcating the general standards of a man of the world rather than those of a moralist. Consult: *Letters of Chesterfield*, ed. by Lord Mahon (London, 1845–53) and by J. Bradshaw (London, 1892); also Browning, *Wit and Wisdom of Lord Chesterfield* (London, 1875); Hill, *Worldly Wisdom of Lord Chesterfield* (New York, 1891); Ernst's biography, including many letters not before published (London, 1893); Collins, *Essays and Studies* (London, 1895); Birrell, *Lord Chesterfield* (New York, 1905), and the *Life* by Craig (London, 1907). In 1912 there were published in London some hitherto uncollected letters of Lord Chesterfield's ed. by R. M. Louden and appearing as "Some Unpublished Letters of Lord C." in *Nineteenth Century and After*.

CHESTERFIELD INLET. An inlet of Hudson Bay, which extends westward for a distance of over 200 miles from the northwest corner of the bay (Map: Canada, M 4). It has a variable width, which does not exceed 25 miles, and is in water connection, near its head, with the string of large lakes lying to the southwest. It contains a number of islands, and at its western extremity it widens into Baker Lake.

CHESTER PLAYS, THE. A group of mystery plays on scriptural subjects, 24 in all, played by the guilds of Chester during three days at Whitsuntide. A sixteenth-century proclamation concerning them ascribes them, in obscure phrase, to either Sir Henry Francis, a monk, or to Sir John Arnway, mayor of Chester in 1327–28. The only complete edition of them was made by Mr. Thomas Wright, for the Shakespeare Society, London (2 vols., London, 1843–47).

CHES'TERTON, GILBERT KEITH (1874–). An English author, born in London and educated at St. Paul's School. After studying art for a while, he began at an early age to write for various periodicals and newspapers in London, attracting prompt attention by his brilliant and vigorous prose style and by the originality of his opinions (or of his way of expressing his opinions) on every sort of subject. A certain unexpectedness gave piquancy to his writing and especially to his criticism. If not always taken seriously, at least he came to be widely read, and his books, which represent poetry, fiction, miscellaneous essays, biography, and criticism, firmly established him as one of the most attractive of the English writers of his day. So nimble is he that in some of his essays the reader's mind, though fascinated, wearies in following his intellectual pyrotechnics. Mr. Chesterton has published two books of verse, *The Wild Knight* and *Greybeards at Play* (both in 1900); a collection of miscellaneous writings, *The Defendant* (1901); and two somewhat erratic stories, *The Napoleon of Notting Hill* (1904) and *The Club of Queer Trades* (1905). Of his biographies, the following deserve especial mention: *Robert Browning* (1903); *G. F. Watts* (1904); *Charles Dickens* (1906); *George Bernard Shaw* (1909). Other and even more characteristic works by Chesterton are *Heretics* (1905); *Orthodoxy* (1908); *Tremendous Trifles* (1909); *The Ball and The Cross* (1910); *What is Wrong with the World?* (1910); *Alarms and Discursions* (1911); *Man Alive* (1912); *The Victorian Age in Literature* (1913); *Magic* (1913); *The Flying Inn* (1914). Consult the anonymous *G. K. Chesterton: A Criticism* (London, 1908).

CHES'TERTOWN. A town and the county seat of Kent Co., Md., 30 miles (direct) east of Baltimore, on the Chester River, and on the Pennsylvania Railroad (Map: Maryland, N 4). It has planing and strawboard mills and phosphate and basket factories. Washington College, organized in 1773, is situated here. Pop., 1900, 3008; 1910, 2735.

CHESTNUT, chĕs'nŭt (formerly *chesten-nut*, a contamination of AS. *cisten*, OHG. *chestinna*, *kestinna*, Ger. *Kastanie*, chestnut, and OF. *chastaine*, It. *castagna*, Lat. *castanea*, chestnut, from Gk. *καστανέα*, *kastanea*, Arm. *kask*, chestnut; connected with Gk. *Κάστανα*, *Kastana*, or *Καστανάια*, *Kastanaia*, a city of Pontus noted for chestnuts). (*Castanea.*) A genus of plants of the family Fagaceæ, closely allied to the beech (*Fagus*), but botanically distinguished from it by long male catkins, set with groups of flowers, a five to eight celled ovary (bur), and one to three compressed, rounded nuts. Three species are of horticultural and commercial importance for their nuts and wood—the European of Spanish chestnut (*Castanea vulgaris*), the Japanese (*Castanea japonica*, or *Castanea crenata*), and the American (*Castanea dentata*). The European chestnut grows wild in extensive forests in the south of Europe, west of Asia, and north of Africa, and is a large, stately tree. The nuts are usually two in each bur, very large, and of a dark mahogany color. The American chestnut is taller and more spreading. In forests it reaches a height of 100 feet, with a trunk 3 to 4 feet in diameter. It is native from Maine to Michigan and southward to Louisiana and is generally found on high, sandy land, gravel ridges, or mountain slopes comparatively free from limestone. The Japanese chestnut is a smaller tree than either the European or American and has a compact, symmetrical habit. Its large nuts, early and heavy bearing propensities, comparative freedom from blights, and complete union on either its own American-grown or on native American seedlings have brought it into extended use in the United States within recent years as an orchard tree and in grafting over native chestnut forests. Chestnuts are usually propagated from seed, and the seedlings are later grafted or budded with improved varieties. Chestnut timber is coarse-grained, light, and durable, and it finds

extensive use in furniture making and for posts and fence timbers.

In addition to the three species noted above, there are a number of dwarf forms known as chinquapins. The common, or tree, chinquapin (*Castanea pumila*) and the bush chinquapin (*Castanea nana*) are natives of the States south and west of Pennsylvania as far as Texas. The former is a shrub 4 to 5 feet high, though occasionally reaching a height of 30 or 40 feet; the latter rarely exceeds 3 feet. The nuts are smaller than chestnuts, but ripen earlier, are edible, and to some extent marketed. A number of other species are native to the East. *Castanea argentea* and *Castanea tungurrut* of Java are large trees with edible nuts. *Castanopsis chrysophylla* is a California evergreen, the small fruit or nuts of which are eaten. The horse-chestnut (q.v.) is entirely different from the true chestnut.

Chestnut trees in the eastern part of the United States are suffering from a very serious blight. First noticed in a park in Brooklyn, N. Y., in 1904, it has spread until in 10 years it was known to occur from New Hampshire to Virginia and westward to western New York and West Virginia. In parts of the country practically all the native chestnut trees have been destroyed. The cause of the disease is the fungus *Endothia parasitica*, and what is believed to be the same species occurs in China, indicating that the disease was introduced from the Orient. No remedy is known for the trouble. Japanese chestnuts seem less subject to injury than the American species.

Food Value.—Chestnuts when fresh contain 84 per cent of edible portion and 16 per cent of refuse (shell). The edible portion has the following percentage composition: water, 45.0; protein, 6.2; fat, 5.4; total carbohydrates, 42.1; and ash, 1.3. The fuel value is 1125 calories per pound. Unlike most nuts, the chestnut is rich in carbohydrates (largely starch) rather than fat or protein. In Europe steamed chestnuts are eaten with either salt or milk. They are also boiled and roasted, or are used combined with other food materials, and in the manufacture of confectionery. In the form of cakes, called in Italy *necci*, they are a common food. In the United States they are eaten raw or roasted, and are also used for making desert, for stuffing poultry, and in other ways. The candied chestnuts, or *marrons glacés*, are also well known. According to recent investigation, cooked chestnuts are quite thoroughly digested. Chestnuts are dried, and are sometimes ground to a flour used for making a bread or cake.

CHESUN'COOK LAKES (N. Amer. Indian, great discharge place). A group of lakes in Piscataquis Co., Me., the chief being Chesuncook Lake, 18 miles long and from 1 to 2 miles wide, and Ripogenus Lake, 2 miles long and 1 mile wide, which are but expansions of the Penobscot River (Map: Maine, C 3). Lake Chesuncook has the following feeding lakes or ponds: Longeley Pond, Umbazooksus Lake, Cuxabexis, Duck and Moose ponds, Mud Pond, Ragged Lake, and Caribou Lake, 7 miles long and 1½ miles wide. Lake Ripogenus has as a feeder Harrington Lake, 3 miles long and 1 mile wide. Lobster Pond, 5 miles long and 1½ miles wide, between Ragged Lake and North Bay of Moosehead Lake, may also be included in the Chesuncook system. Lying to the northwest of this section and directly connected with it by the Cauquomgomoc River, 12 miles long, are Lake Cauquomgomoc, about 7 miles long and nearly 2 miles wide, and its feeding lakes—Lone Lake, Poland Pond, Round Pond, and Shallow Lake.

CHETIMACHES, shĕt'ĭ-màsh', LAKE. See GRAND LAKE.

CHET'TLE, HENRY (?–c.1607). An English dramatist. Of the 13 or more plays of which he was the sole author, only one has survived, the lurid *Tragedy of Hoffman, or a Revenge for a Father* (performed 1602, printed 1631; ed. by H. B. Leonard, 1851). Of 36 plays on which he collaborated, only four were printed. Very attractive is *The Pleasant Comedie of Patient Grissil* (printed, 1603; ed. by J. P. Collier, 1841). Chettle's name is forever linked with Shakespeare's. He edited Greene's *Groatesworth of Wit* (1592), in which Shakespeare was attacked; apologized in a memorable passage in a pamphlet entitled *Kind Heart's Dream* (1592 or 1593; reprinted by C. H. Ingleby in *Shakespeare Allusion Books*, 1874); and apparently alluded to Shakespeare in "Silver-tongued Melicert," in *England's Mourning Garment* (1603; reprinted with *Kind Heart's Dream*, as above). There are two careful editions of Hoffman—one by H. B. L[ennard] (London, 1852); the other by Richard Ackermann (Bamberg, 1894). Consult also Ward, *History of English Dramatic Literature* (London and New York, 1899), and *Cambridge History of English Literature* (Cambridge and New York, 1907–13).

CHEVALIER, shĕv'ă-lēr' (Fr., variant of *cavalier*, lt. *cavaliere*, from ML. *caballarius*, horseman, from Lat. *caballus*, horse). In heraldry, a horseman armed at all points. In the more general acceptation it signifies a knight (q.v.). See BANNERET; CHIVALRY.

CHEVALIER, THE YOUNG. The popular title of the grandson of James II of England, otherwise known as the Young Pretender (q.v.). See STUART, CHARLES EDWARD.

CHEVALIER, she-vă'lyā', ALBERT (1861–). An English music-hall singer, and composer of "coster" songs. He made his first public appearance in 1877, at the Prince of Wales's Theatre, during the Bancroft management, in *An Unequal Match*. For some years he continued as a regular actor at the Court Theatre, with John Hare, and elsewhere, till in February, 1891, he made a great hit at the Pavilion Music Hall, developing his special gift of mimicking the traits of the London costermonger, as in the song *My Old Dutch*. His talents as composer and singer have brought him great popularity. In 1896 he spent some time in the United States, repeating his favorite performance. In 1911 he played at the Savoy Theatre, London. He is also the author of dramatic pieces, notably *Tommy Dodd*, which he produced at the Globe Theatre, London, in 1898, and of a volume of reminiscences called *Before I Forget*.

CHEVALIER, MICHEL (1806–79). A French economist. He was born in Limoges, Jan. 13, 1806, and was at the age of 18 admitted as a pupil of the Polytechnic School. Thence he went to the School of Mines, and some days before the revolution of July he was appointed engineer to the Département du Nord. In early life he accepted the doctrines of Saint-Simon and collaborated with the latter in the publication of the *Organisateur* and the *Globe*. In 1834 he was commissioned by the government



CHESTNUT TREE AND FLOWER SPRAY (Castanea Americana).

to visit North America and to prepare a report on the canals, roads, and railways of that continent. He traveled for two years in the United States, Mexico, and Cuba, and published the results of his experiences in a series of letters in the *Journal des Débats*. In 1840 he was appointed professor of economics in the Collège de France, and in 1845 he was elected a deputy, but served only till next year, his championship of free trade preventing his reelection. He lost his professorship during the provisional government, but later won the favor of Louis Napoleon and was reinstated. In 1860 he became senator. He died in Montpellier in 1879. The most important work with which Chevalier's name is associated was the commercial treaty of 1860 between France and England, negotiated by Chevalier and Richard Cobden. This treaty inaugurated a new era in the commercial policy of western Europe. Of his works, that most frequently quoted is his *Probable Fall in the Price of Gold* (1854). Other works are: *Letters from North America* (1836); *Material Interests in France: Public Works, Roads, Canals, Railways* (1838); *Letters on the Organization of Labor and the Question of the Laborers* (1848).

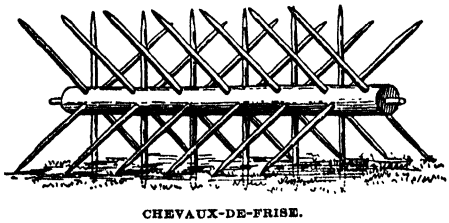
CHEVALIER AU CYGNE, ô sĕ'ny' (Fr., knight of the swan). A character also known as Helias, occurring in the Icelandic sagas, the legends of Germany and Flanders, and the early French romances. In the latter he is made grandfather to Godfrey de Bouillon. His name is more especially familiar as the title of a set of *chansons* composed shortly after the Crusades, among the individual titles of which are *Antioche, Les Chétifs,* and *Les Enfances de Godefroy.*

CHEVALIER DE SAINT GEORGE, de săN zhôrzh (Fr., knight of St. George). A title assumed by the "Old Pretender," James Stuart.

CHEVALIER D'INDUSTRIE, dăN'dụ'strē' (Fr., knight of industry). A man who lives by expedients and trickery. The term is derived from Alexandre Duval's five-act comedy in verse of that name, which was presented at the Théâtre Français on April 3, 1809. The hero, Saint-Remi, is a *chevalier d'industrie,* who palms himself off as a gentleman of quality. The scene is laid in the home of a rich merchant, where, after a number of diverting escapades, Saint-Remi's roguery is finally exposed. It is one of the weakest of Duval's plays.

CHEVALIER SANS PEUR ET SANS REPROCHE, săN pēr à săN re-prôsh'. See BAYARD, PIERRE DU TERRAIL.

CHEVAUX-DE-FRISE, she-vō'de-frēz' (Fr., horses of Friesland). An array of sharp or ragged points placed in a position towards the



CHEVAUX-DE-FRISE.

enemy and designed to stay his advance. They are usually made of wood or iron and are, as a rule, a substitute for regular abatis. See ABATIS; FORTIFICATION.

CHEVECHE, she-vĕsh', or **CIVETTA,** chē-vĕt'tà. The common names in France and Italy, respectively, of the "little owl" (*Carine noctua*) —the bird of Pallas Athene and hence the emblem of Athens and associated with Minerva and the idea of Wisdom. See OWL, and Plate of OWLS.

CHEVERNY, she-vâr'nē', PHILIPPE HURALT, COUNT DE (1528–99). A French statesman and author. He was born at Cheverny, in Brittany, and was appointed Chancellor to the Duke of Anjou, in 1562, through the influence of Catharine de' Medici. Under her son, Henry III, he became Guard of the Seals (1578) and Chancellor of France (1581), but fell into disgrace by supporting the League and was deprived of his post in 1588. In 1590 he was restored to favor by Henry IV, whom he served until his death. Count de Cheverny was the author of *Mémoires d'estat* (1636).

CHEVERT, she-vâr', FRANÇOIS DE (1695–1769). A French general. He was born at Verdun and took part in nearly all of the important campaigns fought during the reign of Louis XV. Marshal Saxe placed him in command of the grenadiers at the battle of Prague, and Chevert and his sergeant, Pascal, were the first to mount the walls of the city. In December, 1742, he heroically defended the same city with a handful of men. His skillful manœuvre decided the battle of Hastenbeck. He became lieutenant general in 1748.

CHEVES, chēvz, LANGDON (1776–1857). An American lawyer and statesman, sometimes called "the Hercules of the United States Bank." He was born in Abbeville Co., S. C.; was self-educated; was admitted to the Charleston bar in 1797 and rapidly rose to eminence as a lawyer. In 1808 he became Attorney-General of his State, and, after serving three terms in the South Carolina Legislature, was elected to Congress by the Young Republican party in 1811. In Congress he was closely associated with William Lowndes, Henry Clay, and John C. Calhoun, and formed with them the celebrated "War Mess." He served as Speaker in 1814, and by his casting vote defeated the Dallas Bill for rechartering the United States Bank. In 1815 he resumed the practice of law in South Carolina, and from 1816 to 1819 was one of the associate justices of the State. In January, 1819, he was elected one of the directors of the United States Bank and in the following March was chosen to succeed Jones as president of that institution. The bank was then in a deplorable condition, and insolvency seemed almost inevitable; but Cheves set about restoring its credit, and, by continuing a previous policy of curtailing the note issues, by enforcing a rigid collection of all balances due from local banks, and by securing a loan of $2,000,000 in Europe, he fully accomplished his purpose within three years. In December, 1822, he resigned, and was succeeded by Nicholas Biddle (q.v.). Subsequently, until his death, he lived in retirement, first in Philadelphia, then in Lancaster, Pa., and finally in Charleston, S. C.; but in 1850 he went as a delegate to the celebrated Nashville Conference, where he expressed himself in favor of a Southern Confederacy, but strongly deprecated any independent action by separate Southern States. A brief account of his services to the United States Bank is given in the *Annual Report of the American Historical Association for 1896* (Washington, 1897).

CHEVILLARD, shĕ-vē′yȧr′, CAMILLE (1859–). A French composer and conductor. He was born in Paris, Oct. 14, 1859, a son of the famous 'cellist Pierre Chevillard. He studied piano under G. Mathias, while in composition he was almost entirely self-taught. For several years he acted as assistant conductor to his father-in-law Lamoureux, whom, on the latter's death in 1899, he succeeded. Under Chevillard the *Concerts Lamoureux* have maintained their high standard of excellence and progressiveness. In 1903 he received the Prix Chartier for chamber music, and was in 1913 president of the Société Française de Musique de Chambre. His compositions comprise a symphonic ballad, a symphonic fantasy, a string quartet, a piano quintet, a piano trio, a sonata for violin and piano, and a sonata for 'cello and piano.

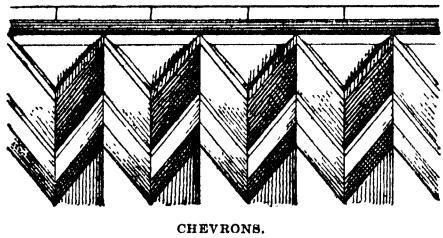
CHEVIOT HILLS, chĕv′ĭ-ŭt *or* chē′vĭ-ŭt. A mountain range in the counties of Northumberland and Roxburgh, on the English and Scotch borders, extending 35 miles, from near the junction of the Till and Tweed in the northeast, to the sources of the Liddel in the southwest (Map: England, D 1). The highest point is Cheviot Peak, 2658 feet high. The hills are noted for a valuable breed of sheep and for their connection with the border warfare of earlier history.

CHEVREAU, shę-vrō′, HENRI (1823–1903). A French legislator. He was born in Belleville, Seine. He was one of the strongest supporters of the coup d'état of 1851. In 1870 he superseded Baron Haussmann as Prefect of the Seine and, after the first defeat sustained by the French army in that year, was appointed Minister of the Interior. In this capacity he energetically promoted the organization of the Garde Mobile throughout the country, encouraging the formation of bodies of *francs-tireurs* (sharpshooters), and completing in Paris the equipment of 60 new battalions of the Garde Nationale. After the disaster at Sedan and the revolution of September 4, he fled to Brussels and subsequently rejoined the Empress Eugénie in England. He was elected a member of the Chamber of Deputies in 1885.

CHEVREUL, shę-vrēl′, MICHEL EUGÈNE (1786–1889). A French chemist, born at Angers, in the Department of Maine-et-Loire. He studied chemistry in Paris, became assistant to Vauquelin, and in 1813 was appointed professor of the physical sciences at the Lycée Charlemagne. In 1820 he was made examiner in the Ecole Polytechnique and in 1824 director of the dyeing department in the Gobelin manufactory. In 1830 he became professor of applied chemistry in the Museum of Natural History and in 1879 retired from active service. In recognition of his important services to science many honors were conferred upon him; he was made a member of the Institute, a fellow of the Royal Society of London, a commander of the Legion of Honor, etc. In 1886 the centenary of his birth was celebrated with great enthusiasm; and in the same year Harvard University, on the two hundred and fiftieth anniversary of its foundation, conferred upon him the degree of LL.D. A monument to his memory was erected at Angers in 1893. Another statue of Chevreul may be seen in the Museum of Natural History in Paris. Among his researches may be mentioned his successful investigation of the chemical nature of fats, which has led to the achievement of industrial results of the greatest importance. He was the first to demonstrate that the various fats are mixtures of glycerides, or compounds of glycerin with oleic, stearic, and palmitic acids. (See FATS.) He recognized that the stearic acid (or usually rather a mixture of stearic and palmitic acids) that may be obtained from solid fats would make an excellent material for candles. He was, however, unable to "break the grain" of the stearic acid (i.e., to prevent it from solidifying in the form of large crystals), and this was at least one of the reasons of the failure of his attempt to found the "stearin-candle" (or, as it should be called, the "stearic-acid candle") industry. Nevertheless it was on the basis of the discoveries of Chevreul that this important industry was subsequently established in 1851. He wrote: *Recherches chimiques sur les corps gras d'origine animale* (1823); *Considérations générales sur l'analyse organique et sur ses applications* (1824); *Leçons de chimie appliquée à la teinture* (2 vols., 1831); *De la loi du contraste simultané des couleurs et de l'assortiment des objets coloriés* (1839); *Théorie des effets optiques que présentent les étoffes de soie* (1846); *Des couleurs et de leur application aux arts industriels* (1864); *Résumé d'une histoire de la matière* (1878); etc. Consult Malloizel, *Œuvres scientifiques de Chevreul* (1887); also Hofmann, "Nekrolog auf Chevreul," in the *Berichte der deutschen chemischen Gesellschaft*, for 1887.

CHEVREUSE, shę-vrēz′, MARIE DE ROHAN, DUCHESSE DE (1600–79). One of the foremost opponents at the court of France to Richelieu, who banished her to England. After the death of Louis XIII she returned and participated in the Fronde (q.v.), defending Condé. She was a patron of La Rochefoucauld (q.v.). She was the widow of the first Duke of Luynes when she married Claude of Lorraine, Duc de Chevreuse. Consult the biography by Cousin (7th ed., Paris, 1886).

CHEVRON, shĕv′rŭn (Fr., ML. *capro*, rafter, from Lat. *caper*, goat). Any ornament in the form of a V, whether isolated, arranged in rows with the points in the same straight line, or in rows, side by side. In the latter case the ornament is more generally called a zigzag. Chevrons



CHEVRONS.

play an important part in Assyrian ornament; and, in the form of molded zigzags, in the French Norman and Anglo-Norman architecture of the eleventh and twelfth centuries, especially in the decoration of arch moldings. In heraldry (q.v.), one of the charges known as ordinaries.

CHEVRONS, shĕv′rŭnz (Fr. *chèvre*, a goat). Badges or insignia of rank consisting of stripes meeting at an angle and worn on both sleeves of the coat by noncommissioned officers. *Sleeve insignia* for rated enlisted men, not noncommissioned officers, are sometimes called *chevrons*. In the United States army such badges of rank are worn by all noncommissioned

officers and are of cloth corresponding in colors and pipings to the patterns laid down for stripes on trousers. (See UNIFORMS, MILITARY.) The chevrons are worn with the points up and midway between the elbow and top of sleeve. They are worn on the sleeves of the overcoat and all coats; also on the sleeves of the sweater in the field and on the sleeves of the olive-drab shirt when worn without the coat or sweater. The word *chevrons* is often improperly used to designate the *service stripes* worn by all enlisted men who have served faithfully for a period of three years. A *stripe* is added for each such period. They are worn diagonally on both sleeves of the dress coat below the elbow, and are of the color of the facings of the arm in which the service was rendered. To indicate *service in war* half chevrons, or stripes of white, were *formerly* worn on the sleeve. These have been replaced by *campaign badges* worn on the left breast. Previous to 1902 chevrons were worn with the points down, except by the cadet officers of the United States Military Academy and the noncommissioned officers of the United States Marine Corps.

Chevrons worn by noncommissioned officers of the line, according to their rank, are as follows: *regimental sergeant major*, three bars and an arc of three bars; *regimental quartermaster sergeant*, three bars and a tie of three bars; *regimental commissary sergeant*, three bars and a tie of three bars, having a crescent (points rear); *squadron* or *battalion sergeant major*, three bars and an arc of two bars; *chief musician*, three bars and an arc of two bars, with a bugle in the centre; *chief trumpeter*, three bars and an arc of one bar, with a bugle in the centre; *principal musician*, three bars and a bugle; *drum major*, three bars and two embroidered cross batons; *first sergeant*, three bars and a lozenge; *troop*, *battery*, or *company quartermaster sergeants*, three bars and a tie of one bar; *sergeant*, three bars; *color sergeant*, three bars and a star; *corporal*, two bars; *lance corporal*, one bar; *stable sergeant*, *field artillery*, three bars and a horse's head. Post permanent staff, engineer, hospital, ordnance, and signal corps noncommissioned officers wear chevrons in which the stripes are accompanied usually by a cloth device designating the corps or department of the service to which they belong. (See MILITARY INSIGNIA; for conditions under which campaign badges are worn, see UNIFORMS, MILITARY.) The service stripes to indicate enlistment periods, if more than one, are worn one above the other, in the order in which they were earned, one-quarter of an inch distance between them.

Chevrons of varying number and design are worn for the same reason and purpose in practically every civilized army, the English and French systems more closely approaching the United States than do the other nations of continental Europe. Chevrons as badges of distinction were first introduced in the Prussian cavalry in 1889 and are worn by expert swordsmen. In France veterans and noncommissioned officers promoted for long service are called *chevronnés*. In England warrant and noncommissioned officers wear the badges similarly to the French, on the left sleeve of the coat, between the elbow and the shoulder. Four chevrons denote the rank of quartermaster sergeant, three a sergeant, two a corporal, and one a lance corporal of infantry, a bombardier of artillery, and a second corporal of engineers. They are worn point downward. Warrant officers (i.e., regimental sergeant major or bandmaster) are distinguished, the former by a gold crown worn over the left cuff, and the latter by a gold lyre similarly worn. Chevrons for long service are worn by private soldiers on the right forearm, points upward. Chevrons for long service in the case of enlisted men or for rank in the case of noncommissioned officers below the rank of full sergeant are of cotton braid, the color of which is determined by the arm of the service to which the wearer belongs. Noncommissioned officers of sergeant's rank and upward wear gold chevrons.

CHEVROTAIN, shĕv'rō-tān' (Fr., from OF. *chevrot*, dim. of *chevre*, from Lat. *caper*, goat). A group (Tragulina) of diminutive, hornless, deerlike animals, the smallest-known ungulates, which are intermediate in structure between pigs, camels, and deer, but resemble agoutis in form, standing only about 12 inches high. Several species inhabit southern India, Ceylon, and the Malayan region, and one inhabits the Philippines. These belong to the genus *Tragulus*, and the best known are the kanchil (*Tragulus kanchil*) of the Malayan Islands and the Indian chevrotain, or mouse deer (*Tragulus meminna*), which differs from the others in being spotted with white. Usually the fur has some soft and beautiful hue of rufous, tawny, or mouse gray. In West Africa is a related species, the "biche cochon," or "water deer" (*Dorcatherium aquaticum*), which is rich brown, with the back and sides spotted and striped. All are shy little creatures, walking with a queer, stiff-legged, tiptoeing gait and hiding in thickets and rocky jungles, but capable of becoming gentle pets. These constitute the family Tragulidæ, which seems to be a scant survival of a group of forms widely distributed throughout all the temperate zone in Middle Tertiary times, and traceable to the same ancestry as the deer. See Plate of FALLOW DEER, MUSK, ETC., with DEER.

CHEVY (chĕv'ĭ) **CHASE** (probably a corruption of Fr. *chevauchée*, raid; scarcely connected with Eng. *chevy*, *chivy*, to drive, from Gypsy *chiv*, goad). The name of perhaps the most famous of British ballads. It has been preserved in two forms, known severally as the Scotch version and the English version, of which the former is the older and the more imaginative. To the Scotch ballad there is a reference in *The Complaynt of Scotland* (1549), and apparently in Sidney's *Apologie for Poetrie* (1595). The English poem, best known in England, was praised by Addison for its naturalness and simplicity (*Spectator*, Nos. 70, 74, 85) and continues to be a favorite poem. It is impossible to reconcile its incidents with history, but the event which is meant to be commemorated appears to have been the battle of Otterburn, in August, 1388—a fight which Froissart declares to have been the bravest and most chivalrous which was fought in his day. According to the ballad, Percy, surnamed Hotspur, vowed that he would enter Scotland and take his pleasure for three days in the woods of his rival and slay the deer therein at will. Douglas sent back word that he would prevent the sport. Accordingly, at the time of the hay harvest, Percy, with staghounds and archers, passed into the domains of his foe and slew 100 fat bucks. After the English had hastily cooked their game, Douglas, clad in armor and heading his Scot-

tish spears, came on the scene. Haughty challenge and defiance passed between the captains, and the battle joined. In the centre of the fray the two leaders met, and during the fierce combat an English arrow struck Douglas to the heart. "Fight on, my merry men all!" cried he, and died. Percy, with all the chivalrous feeling of his race, took the dead man by the hand and vowed that he would have given all his lands to save him, for a braver knight never fell by such a chance. Sir Hugh Montgomery, having seen the fall of Douglas, clapped spurs to his horse, dashed on Percy, and struck his spear through his body a long cloth yard and more. When the battle ended, representatives of every noble family on either side of the border lay on the bloody greensward. Consult "The Hunting of the Cheviot," in Child, *English and Scottish Ballads*, vol. iii (Boston, 1878; last ed., with memoir by Kittredge, 1898); Gummere, *The Popular Ballad* (New York, 1907); and see BALLAD.

CHEW, BENJAMIN (1722–1810). An American jurist, born at West River, Md. He studied law in the office of Andrew Hamilton (q.v.) in Philadelphia, Pa., and afterward in London; returned to Philadelphia in 1754 and was successively Register of Wills, Attorney-General, and Chief Justice of Pennsylvania. After the adoption of the Declaration of Independence he joined the ranks of the Loyalists, or Tories, resigned the chief-justiceship, and retired to private life. Stubbornly refusing to sign a parole, he was imprisoned at Fredericksburg, Va., in 1777. In the same year his elegant mansion (still known as the "Chew House") in Germantown was badly damaged by the cannonading to which it was subjected during the battle of Germantown, its occupation early in the engagement by the British, and the unwise attempt of the Americans to capture it, probably turning the fortunes of the day. (See GERMANTOWN.) Chew was President of the High Court of Errors and Appeals from 1790 until the abolition of this court in 1806.

CHEW, NG POON (1866–). A Chinese-American editor, born at Sun Ning, China. He was educated in the Occident School, San Francisco, and in the San Francisco Theological Seminary. His Chinese parents intended him for the Taoist priesthood, but he became converted to Christianity and entered the Christian ministry. He resigned his ministerial work in 1899 and began the publication of the first Chinese illustrated weekly and of *Chung Sai Yat Po*, the first Chinese daily newspaper in the United States. He became adviser to the Chinese consulate general in 1906. Chew came to be regarded as an authority on matters of Chinese exclusion and of American-Chinese relations. He published *Non-Exclusion* (1905) and *Treatment of Exempt Classes of Chinese in America* (1908).

CHEWING GUM. A preparation of some form of gum resin, to which a flavoring matter is often added. The gum resin of black spruce (*Abies nigra*), in its original state, was probably first used for this purpose; but the demand is now supplied by various manufactured preparations, and spruce gum occurs less frequently than formerly. The gum resins of sweet gum (*Liquid-ambar styraciflua*), tamarack (*Larix americana*), and certain other forest trees are also used. The substance most extensively employed in the manufacture of chewing gum is chicle gum (13,758,592 pounds, valued at $5,282,722, having been imported into the United States in 1913), an elastic gum from the naseberry (*Achras sapota*), a tree found in Central and tropical South America, somewhat similar to the India-rubber tree. Balsam of tolu, also found in South America, is a constituent of certain kinds of gum, while paraffin has also been employed. The gum of the white sap of the South and Central American trees is usually first allowed to oxidize and then melted in a crude oven and the resulting product flavored with brown sugar and colored with appropriate stains and flavoring matters. This may be done before export, but in the United States the product is carefully worked up in large factories. The practice of chewing gum is probably harmless, and in mild cases of indigestion it may even be somewhat beneficial, by mechanically stimulating the flow of saliva. Pepsin and similar substances are often mixed in with the gum; but it is safe to say that the success of any particular brand depends more upon its sweetness and flavor than upon any beneficial properties.

CHEWINK, chē-wĭnk′ (imitation of its cry), or TOWHEE. A large terrestrial finch of the genus *Pipilo*, represented by several species in North America, of which the common Eastern species, the red-eyed towhee (*Pipilo erythrophthalmus*), is best known. It is about 8 inches in length, of which the tail is nearly half. The male is black, with a white belly and chestnut sides and with prominent white markings on the tail. The female is grayish brown where the male is black. It is a migratory bird, wintering in the Southern States and breeding from Georgia northward. The nest is built on or near the ground, of bark and leaves, lined with grass, and usually most cleverly hidden by an apparently accidental roof of twigs, leaves, etc. Eggs, four or five, white, spotted with rufous. The chewink is an active bird, spending its time mostly on the ground in woods and thickets, scratching about in the leaves in search of its insect prey, and now and then flying to some low branch or convenient fence rail to utter his melodious "chewink," or, in the spring, to pour forth a short but most musical song. The various names "chewink, towhee, joree," etc., are in imitation of its sharp call note, while "ground robin" refers to its colors, suggesting those of the American robin. See Plate of SPARROWS, and Plate of EGGS OF SONG BIRDS.

CHEYENNE, shī-ĕn′, *local pron.*, shī-ăn′. The capital of Wyoming and the county seat of Laramie County, 105 miles by rail north of Denver, Colo., on the Union Pacific, the Burlington and Missouri River, and the Colorado and Southern railroads (Map: Wyoming, G 4). Among the prominent buildings are the State Capitol and Governor's mansion, the High School, Carnegie Library, Federal Building, Elks' Home, County Hospital, Catholic Convent, Opera House, and the stone depot of the Union Pacific Railroad. There are three attractive parts. Fort D. A. Russell, a well-equipped military post, is 3 miles distant from the city. The annual celebration of Frontier Days at Cheyenne attracts thousands of visitors. The city is an important stock-raising centre, with large stock-feeding yards and an independent packing establishment, and has railway shops of the Union Pacific, pressed-brick works, and an ice plant. Iron is mined in the vicinity. The place was first settled in 1867,

when the Union Pacific Railroad reached that point, and in 1869 was chosen as the territorial capital of Wyoming. In the same year a large portion of the town was destroyed by fire. Cheyenne has adopted the commission form of government. Its water works are owned by the municipality. Pop., 1900, 14,087; 1905, 13,656; 1910, 11,320.

CHEYENNE, shē-ĕn′. A brave and warlike Plains tribe of Algonquin stock. They lived at one time on the Cheyenne River, a tributary of the Red River of the North, and according to tradition were friends of the Ojibway and the Dakota while these two powerful tribes were at war with each other. At last the Ojibway became suspicious, set upon the Cheyenne, and drove them down into the Dakota country. After this they roamed about the headwaters of the Platte, finally dividing into two bands, one of which became affiliated with the Kiowa of the South and the other with the Dakota of the North. These groups are, respectively, the Southern and Northern Cheyenne. They number 3055 and are confined to reservations in Montana and Oklahoma. In culture they are typical Plains Indians, living in tepee, observing the Sun Dance, and maintaining a complex social organization. Their ceremonies have been described by Dorsey, *Field Columbian Museum Publications* (Chicago, 1905).

CHEYNE, chā′nē, GEORGE (1671–1743). An English physician. He was born in Methlick, Aberdeenshire, studied in Edinburgh, and in 1702 went to London, where he was elected fellow of the Royal Society. He became enormously corpulent and, having secured relief by a milk and vegetable diet, recommended this treatment in all his subsequent treatises. His works, eminently argumentative in tone, were widely popular and were translated into foreign languages. They include: *Essay on Health and Long Life* (1724; 7th ed., 1726); *The English Malady* (1733; 6th ed., 1739); and *Essay on Regimen* (1740). His correspondence with Richardson, the novelist, appeared in 1817, as *Original Letters, edited by Rebecca Warner.*

CHEYNE, THOMAS KELLY (1841–1915). An English biblical critic. He was born in London, Sept. 18, 1841; took the degree of B.A. at Oxford, 1862; was fellow of Balliol College there, 1868–82; became Oriel professor of the interpretation of Holy Scripture, 1885; and canon of Rochester, 1885. He was rector of Tendring, Essex, 1880–85; a member of the Old Testament Revision Company, and Bampton lecturer, 1889. His publications include: *Commentaries* on Isaiah (1880–81; 3d ed., 1884), Jeremiah (1883–84), Hosea (1884), Micah (1882); a new translation of the Psalms (1884); and critical works, such as *Job and Solomon* (1887); *Jeremiah: His Life and Times* (1888); *The Hallowing of Criticism* (1888); *The Origin and Religious Contents of the Psalter* (Bampton lectures, 1891); *Aids to the Devout Study of Criticism* (1892); *Founders of Old Testament Criticism* (1894); *Introduction to the Book of Isaiah* (1895); *The Christian Use of the Psalms* (1899); *Jewish Religious Life after the Exile* (1898); *Critica Biblica* (1904); *Bible Problems and the New Material for their Solution* (1904); *Traditions and Beliefs of Ancient Israel* (1907); *Decline and Fall of the Kingdom of Judah* (1908); *The Two Religions of Israel* (1910); *Mines of Israel Re-explored* (1912); and *The Veil of Hebrew History* (1913). With J. S. Black he edited the *Encyclopædia Biblica* (1899 et seq.).

CHEYNE-STOKES RESPIRATION. A type of breathing occurring in severe cases of disease of the brain, heart, kidneys, or severe general infections, and usually presaging death. The respirations occur in a regular cycle or rhythm; they gradually become accelerated and deeper up to a certain point, when they grow progressively shallower until breathing has apparently ceased; then, after a long pause, another cycle begins.

CHEYNEY, chā′nĭ, EDWARD POTTS (1861–). An American historical and economic writer, born at Wallingford, Pa. The University of Pennsylvania, from which he graduated in 1883, and where he later became professor of history, conferred the degree of LL.D. upon him in 1911. He spent the years 1884, 1894, and 1904–05 in foreign travel, visiting German universities and studying at the British Museum. His writings, of widely recognized value as college textbooks, include: *Social Changes in England in the Sixteenth Century* (1896); *Social and Industrial History of England* (1901); *Short History of England* (1904); *European Background of American History* (1904); *Readings in English History* (1908); *A History of England, from the Defeat of the Armada to the Death of Elizabeth* (2 vols.; vol. i, 1914). He contributed to the first edition of the NEW INTERNATIONAL ENCYCLOPÆDIA.

CHÉZY, shā′zē′, ANTOINE LÉONARD DE (1773–1832). A French Orientalist, born at Neuilly. He was the son of Antoine de Chézy (1718–98), a well-known engineer. After studying engineering, in 1799 he entered the Bibliothèque Nationale as librarian in the department of manuscripts, and published *Les amours de Medjnoun et Leila* (1806), a translation from the Persian of Jami. He devoted himself to Sanskrit also, and a chair of that language was created for him at the Collège de France (1814). Among his works are an analysis of the *Meghaduta* of Kalidasa (1817); *La mort de Yadjnadatta* (1826); *La reconnaissance de Sacountala* (1830, trans. and text); and *L'anthologie érotique d'Amarou* (1831).

CHHATISGARH, chŭt′ēs-gŭr′. A division of the Central Provinces, British India (q.v.), comprising formerly the districts of Raipur, Bilaspur, and Sambalpur, and several small feudatory states. In 1906 Sambalpur was given to Bengal, and the district of Drug constituted out of parts of Raipur and Bilaspur. These three districts now form the division. The name "Chhatisgarh" means the 'Thirty-six forts.' Area, 21,240 square miles. Pop., 1901, 2,642,983; 1911, 3,246,767.

CHHINDWARA. See CHINDWARA.

CHIABRERA, kyà-brā′rà, GABRIELLO (1552–1638). An Italian poet, sometimes called the Italian Pindar. He was born at Savona, June 8, 1552. A posthumous child, he was educated under his uncle's care in Rome, where he afterward lived many years; but having taken vengeance for an injury done him by an Italian nobleman, he retired to his birthplace, where he married at the age of 50, and where, supported by the patronage of the leading princes of Italy, he spent the rest of his life in independence and the tranquil enjoyment of literary pursuits. Among Chiabrera's *canzonette* are several gems that have entered the *Golden Treasury* of Ital-

ian poetry to stay. His work in general has a great historical importance. His rigid adherence to imitation of the classics left little room for originality of thought; but the sculptural effect of his metrical studies widened the outlook of his contemporaries in matters of form, where his methods influenced moderns like Parini and Carducci. The so-called imitations of Pindar and Anacreon were really inspired by Ronsard and the French *Pleiade*, something of whose spirit Chiabrera caught and indicated to later Italian poets. Consult: bibliography by Varaldo (in *Giornale storico della lett. ital.*, xiii, xiv); autobiography in works (Milan, 1807–08, and Florence, 1863); selected works (Florence, 1865) and in *Oxford Book of Italian Verse* (Oxford, 1910).

CHIAJA, kyä'yȧ, LA (dialectic form of It. *piazza*, place, park). A fashionable boulevard in modern Naples, extending along the coast for about a mile from the Largo Vittoria. Upon it is the Villa Nazionale.

CHIANA, kyä'nȧ. A river, the ancient Clanis, in central Italy, which once belonged entirely to the Tiber system. In ancient days it often flooded the valley of Clusium (modern Chiusi) and even caused a dangerous rise of the Tiber at Rome; hence in 15 A.D., according to Tacitus (*Annales*, i. 79), it was proposed to change the channel so as to divert its waters into the Arno, but the people of Florence objected, being unwilling to face the added danger of floods themselves. In the Middle Ages silt from the mountain streams converted the level, fertile valley from Arezzo to Chiusi into a swamp (which Dante spoke of as an accursed sink). Now, as the result of the drainage system carried out at the beginning of the last century by Count Fossombroni (q.v.), the valley is one of the most fruitful districts in Italy. A watershed was formed which sends the Chiana Toscana, or Maestro Canal, north into the Arno, and the Chiana Romana south into a branch of the Tiber at Orvieto. Among the lakes of the Chiana valley are Montepulciano and Chiusi.

CHIANTI, kyän'tē. A name applied to the mountain district of Siena in Tuscany, central Italy, about 30 miles southeast of Florence, which produces the red wine known by the name of the district.

CHIAPA, chē-ä'pȧ, BISHOP OF. A title often applied to Bartolomé de las Casas, the famous Spanish Dominican, who held that office between 1544 and 1547, and made every effort to ameliorate the condition of the Indians in Mexico and elsewhere. See LAS CASAS.

CHIAPAS, chē-ä'pȧs (from the Aztec tribe of *Chiapanecs*, *Chapanecs*, or *Chapas*, who derived their name from Aztec *chapa*, red macaw). A Pacific state of Mexico, situated at the southeastern end of the country, and bounded by the State of Tabasco on the north, Guatemala on the east, the Pacific on the south, and the states of Oaxaca and Vera Cruz on the west (Map: Mexico, N 9). It covers an area of 27,222 square miles. In the southern part are a number of volcanoes, ranging in altitude from about 1500 to over 7000 feet, while the centre consists of a fertile plateau, the most cultivated portion of the state. The climate is moderate and healthful. The state produces corn, coffee, cocoa, sugar, tobacco, and indigo in small quantities, as agriculture is still in a backward condition; gold, silver, copper, and petroleum are mined. Near Palenque, one of the towns in the northeast of Chiapas, are some of the most extensive and magnificent ruins in this portion of America. Pop., 1900, 360,799; 1910, 438,843, chiefly aborigines. Capital, Tuxtla Gutiérrez, pop., 1910, 10,217. Consult: Stephens, *Incidents of Travel in Central America, Chiapas and Yucatan* (2 vols., New York, 1841; 12th ed., New York, 1867); *The State of Chiapas* (Mexico, 1895).

CHIARAMONTE GULFI, kyä'rȧ-mōn'tȧ gōōl'fē. A town in the Sicilian Province of Syracuse, situated on a high hill, about 8 miles north of Ragusa. The chief occupation is the cultivation of the vine. Pop., 1901, 10,548; 1911, 13,200.

CHIARAMONTI, kyä'rȧ-mōn'tē, MUSEO. A division of the Vatican Museum (q.v.), arranged in a corridor 900 feet long, containing some 300 marble sculptures.

CHIARI, kyä'rē (It., clear). A city in the Province of Brescia, north Italy, 36 miles east of Milan (Map: Italy, D 2). It has silk factories and tanneries. On Sept. 1, 1701, the Austrians, under Prince Eugene, here defeated the French and Spanish, under Villeroi. Pop., 1901, 10,810; 1911, 12,489.

CHIARINI, kyȧ-rē'nē, GIUSEPPE (1833–1908). Italian scholar and poet. Beginning life as an official in the Department of Public Education, Chiarini was in 1866 president of the Liceo of Livorno; in 1882, of the Liceo Umberto I, Rome, and in 1892 general superintendent of secondary education. Remembered especially as the friend and interpreter of Carducci, Chiarini lives in his own right as author of nearly 200 critical studies on Italian literature of the nineteenth century, as a translator of Heine, and as the author of a volume of poems, *Lacrymæ*. Consult D'Ancona, in *Rassegna bibliografica* (1908).

CHIAROSCURO (CHIARO-OSCURO), kyä'rō-skōō'rō (It., light and dark, from Lat. *clarus*, clear + *obscurus*, obscure). Arrangement of light and shade in a work of art—a most important matter, for without light and shade the sense of projection, rotundity, and corporeity cannot exist. But chiaroscuro is more than that element which gives volume to an object or group of objects; it is at its best that pervading sense of light which merges into shadow still carrying the qualities of light and color with it, so that the whole object may be homogeneous in color. Painters often fail to produce this effect, and the color of an object, after merging into shadow, loses in some hands, in the shadowed portion, the quality that rightly belongs to it. The first great master of chiaroscuro in Italian painting was Leonardo da Vinci, and it was the chief characteristic of the art of his pupils. It was developed to the highest extent by Correggio, the chief effect of whose paintings depends upon this quality, which he mastered with consummate skill. Among the Germans it was practiced especially by Grünewald. Chiaroscuro was the most salient technical characteristic of Dutch painting, and its greatest master of all times was Rembrandt, into whose very depths of shadow we may look and still feel a sense of light reaching thither. Consult the bibliography of COLOR.

CHIASMA, kī-ăz'mȧ, or **CHIASM.** An X-shaped decussation of nerve trunks. The term refers especially to the *optic chiasm*, where the optic nerves meet and cross at the base of the brain. See DECUSSATION.

CHIASMUS, kī-ăz'mŭs. See SYNTAX, FIGURES OF.

CHIASTOLITE, kī-ăs'tō-līt (from Gk. χιαστός, *chiastos*, diagonal, from χιάζειν, *chiazein*, to yawn, from χι, *chi*, name of the twenty-second letter of the Greek alphabet + λίθος, *lithos*, stone). A dark-colored variety of andalusite, consisting of stout crystals which, owing to a regular arrangement of carbonaceous impurities through the interior, show in cross section a colored cross, square, or tesselated figure. This mineral is found in Andalusia, Spain, in Tirol, in Saxony, in Austria, and elsewhere in Europe, where it is frequently sold as a gem and, owing to the crosslike appearance, is prized, especially among the lower classes. In the United States the best chiastolites are found in Lancaster and Westford, Mass., and especially in Mariposa Co., Cal.

CHIAVARI, kyä'vä-rē. A maritime city in the Province of Genoa, Italy, 24 miles east-southeast of Genoa (Map: Italy, D 3). Numerous old towers, one of them of considerable size, are scattered through the town, which has a city hall, statues of Garibaldi and Mazzini, by Rivalta, attractive public gardens, good bathing, a technical and nautical school, and a gymnasium. It is a market for wine, oil, cheese, and fish, and manufactures lace, silk, and furniture, particularly the slender chairs called *sedi di Chiavari*. Chiavari is a starting point for the ascent of Mount Penna; altitude, 5690 feet. Pop., 1901, 12,500; 1911, 13,700.

CHIAVENNA, kyä-vĕn'nä (Lat. *Clavenna*, probably from *clavis*, key). A town in the Province of Sondrio, north Italy, picturesquely situated north of Lake Como, on the Mera, at the mouth of the Bregaglia valley, through which passes the road to the Engadine (Map: Italy, D 1). The beautiful church of San Lorenzo has a campanile rising from an arcaded inclosure. Interesting, also, are the ruins of an unfinished castle, and the Giants' Kettles (*marmitte dei giganti*), in the Capiola valley. The chief trade is in fruit and wine, and the manufactures include silk, cotton, beer, and a coarse ware cut out of a soft stone found in the neighborhood. The situation made the ancient Clavenna one of the most important keys to the Alps. Pop., 1901, 4788; 1911, 4547.

CHIBA, chē'bä. A prefectural town of Japan, situated on the coast, about 17 miles by rail from Tokio (Map: Japan, G 6). It yields large quantities of marine products. Pop., 1898, 26,223.

CHIB'CHA, or MUYSCA. An important nation or confederacy centring, at the time of the Spanish Conquest, on the upper Magdalena River, about Bogotá, Colombia, their language being the general trade language throughout the whole mountain region of that country. Detached tribes of the same stock were found along the isthmus, and in Costa Rica. The chief tribes of the Chibchan stock were: in Colombia, the Chibchas or Muyeas of the region of Bogotá, the Aruacs of Santa Marta, the Tunebos, east of Bogotá; in the Isthmian region and Costa Rica, the Guaymis, Doraskeans, Talamancans, Guetares, and Guatusos. To these Rivet would add the tongues hitherto classed in three other separate stocks, viz., Barbacoan, Paniquitan, Coconucan. In culture the Chibchas ranked close to the Quichuas, practicing agriculture by the aid of an extensive system of irrigation, weaving cotton cloth, and working gold with a high degree of skill, although ignorant of the use of copper and bronze. They offered heroic resistance to the Spaniards, but were finally subdued and well-nigh exterminated, only a few remnants still surviving in their native mountains. Consult: Restrepo, *Las Chibchas antes de la conquista española* (Bogotá, 1896); Benchat and Rivet, *Affinitiés des langues du sud de la Colombie et du nord de l'équateur* (Louvain, 1910), and works therein cited. Consult also Thomas and Swanton, *Indian Languages of Mexico and Central America* (Washington, 1911), and Rivet, *Antiquités de l'équateur* (Paris, 1913).

CHIBOUQUE, or **CHIBOUK**, chī-bōōk' (Turk. *chibuq*, small stick, tube of the pipe). A tobacco pipe used in Turkey and Egypt, having a long wooden stem, often of valuable material, a mouthpiece of glass or amber, and a bowl of baked clay.

CHIC, shēk (Fr., familiar abbreviation of Fr. *chicane*. In the expression *de chic à chic*, 'little by little,' used in France in the sixteenth century; *chic* is the Sp. *chico*). A colloquial term used in painting to express the art of giving efficiency in the most dexterous manner possible, with ability and adroitness closely united. The word is also employed in connection with fashion; and, in this sense, means style, manner, grace, and 'go.' See PSCHUTT.

CHICA, chē'kä (So. Amer.). A dyestuff, which gives an orange-red color to cotton. It is obtained by boiling the leaves of a species of *Bignonia* (*Bignonia chica*, Humb.), a native of the banks of the Cassiquiare and the Orinoco. The Indians use it for painting their bodies.

CHICA, chē'kä (So. Amer. Indian), PITO, POSO, or MAIZE BEER. A fermented liquor made from maize or Indian corn. It is much used in some parts of South America. See BEER.

CHICA (Sp., fem. of *chico*, small, from Lat. *ciccus*, trifle). A lively dance, popular in Spain and in South America as well; possibly of Moorish origin.

CHICAGO, shī-kä'gō. The county seat of Cook Co., Ill., the second city in population and importance of the United States, and the railroad centre and commercial metropolis of the West (Map: Illinois, E 2). It is situated on the southwest shore of Lake Michigan, at the mouths of the Chicago and Calumet rivers, in lat. 41° 53′ 6″ N., long. 87° 38′ 1″ W.; distant 2274 miles from San Francisco, 911 from New York, 790 from Washington, and 915 from New Orleans.

Description. The city, one of the few great metropolises of the world built directly on a lake front, extends along Lake Michigan for 24 miles, occupying, on a remarkably level site, an area of 191.3 square miles, at an average elevation over the larger part of about 15 feet above the level of the lake, which is 582 feet above sea level. Within the municipal limits are several bodies of water—Calumet, Hyde, and Wolf lakes. The largest of these is Calumet Lake, Wolf Lake lying partly in the State of Indiana, the boundary of which adjoins the city limits for some 4½ miles. Chicago was originally built on a flat prairie, which was but slightly elevated above the level of the lake, and which was characterized by sand and swamp; but the grade of a large portion was raised about 10 feet in the years from 1855 to 1860. Many buildings were lifted to the newly established grade during this period, an entire

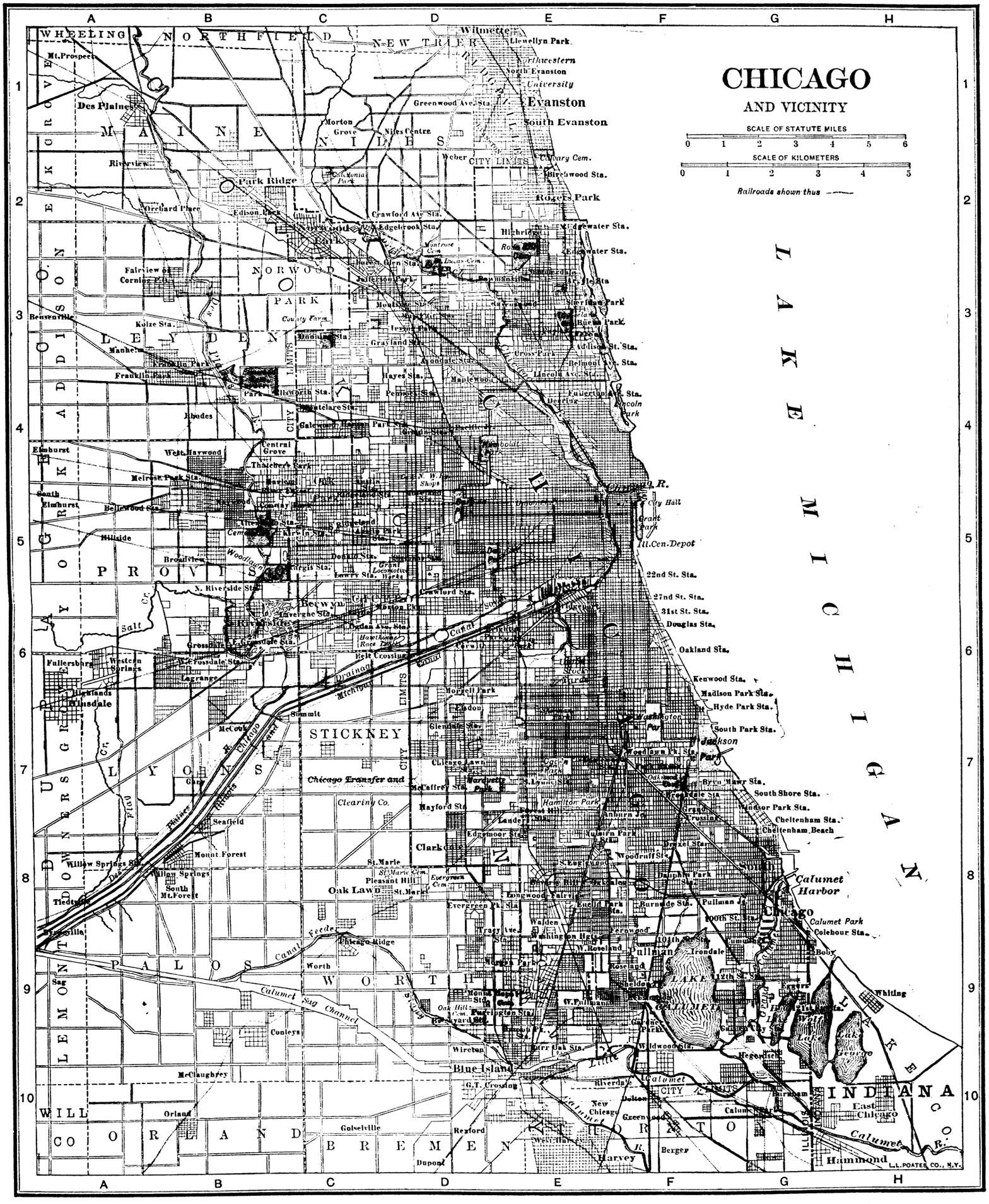
business block on one occasion in a single operation. Foundations of buildings in earlier days rested on the blue clay underlying the surface layers of soil and gravel, but in the later era of tall and heavy structures it has become necessary to sink shafts filled with concrete down to bed rock, 75 to 110 feet below the surface. Upon the columns thus prepared a firm footing is provided for the superstructure.

Nature made of the lake shore a broad beach of sand and gravel, back of which there was formerly a line of sand dunes. These sand dunes, which are characteristic of the shores of Lake Michigan, extend for hundreds of miles towards the south and east, but have long since disappeared within the city limits in the course of the city's building. The city's lake front is protected south from Twelfth Street by the Illinois Central Railroad, and north from Twelfth Street to Chicago Avenue by the Government Pier, which protects the harbor. North from Chicago Avenue the Lake Shore Drive and Lincoln Park are secured by a massive sea wall. Chicago is situated upon both sides of the Chicago River (q.v.), which, at a point little more than one mile from its mouth, is formed by the junction of two streams or branches, one flowing from the northwest and the other from the southwest. The river and branches divide the city into three natural parts, legally known as the South, West, and North divisions. The South Division includes all the territory south of the main river, and the North Division the area north of the river; while the West Division comprises all that part of the city west of the two branches. These sections are connected by 66 bridges, 47 of which are movable. Of the latter, 24 are of the bascule type, i.e., having one or two leaves opening upward; one a vertical lift bridge, i.e., lifted bodily upward; and 22 are swing bridges. The bridges of all the various types are mostly operated by electricity, though some of the older swinging bridges are operated by hand power.

Notwithstanding the fact that Chicago stands on a plain of nearly 200 square miles in extent, it is remarkable that the earth beneath it and below the adjoining waters of the lake and river is honeycombed with a vast network of tunnels. These tunnels are designed for various purposes—some to convey drinking water from the lake, some to afford passage for freight between depots and large establishments, and some for street-car traffic under the river connecting the different divisions of the city. There are also minor tunnels and conduits for the use of the telegraph and telephone companies. The people of Chicago have become the greatest tunnel builders, perhaps, of any community on the face of the earth, and the completion of a new tunnel for any purpose occurs so often that it awakens scarcely a passing comment. There are seven tunnels connecting with cribs, 2 to 4 miles in the lake, delivering about 550,000,000 gallons of water per day to the inhabitants of the city, besides land tunnels connecting these to distant sections many miles to the west, north, and south. Far below the surface, low lying as it is, there are flowing rivers of water conducted through these tunnels, the volume of which is almost beyond comprehension, rivaling, indeed, if not surpassing, in their extent and capacity the aqueducts and conduits of ancient Rome. Three tunnels for the use of street cars pass under the river—one under the main river and two under the south branch; and an intricate system of tunnels, 30 feet below the surface, is in use by the Illinois Tunnel Company, devoted mainly to the carrying of heavy merchandise, thus relieving the streets from congestion to a large extent. These tunnels, with an aggregate length of some 60 miles, are also used largely for the conveyance of wires and cables.

Grade crossings of the steam railroads are obviated by numerous bridges, viaducts, and by track elevation—the city containing more than twice as many miles of elevated tracks as are to be found in the combined mileage of all other cities in the United States. There are about 150 miles of the roadbeds of the different railroads entering the city which have been elevated to an average height of 13½ feet above the level of the streets, at an expense to the railroad companies of upward of $70,000,000. The street-railroad system, comprising electric and elevated roads, operates over 1300 miles of track. There are four elevated roads, having six terminal stations. There is a loop in the business centre, with stations two or three blocks apart, around which trains may pass, although in recent practice they follow a continuous route between the outlying terminals of their respective systems. Thus, for a single fare of five cents, it is possible to travel approximately 25 miles on these lines. The street-car systems, both surface and elevated, have paid the city 55 per cent of their net profits since 1907, when the new franchise was adopted, resulting in the addition to the municipal treasury, up to the end of the year 1913, of upward of $10,000,000. These lines connect all parts of the city and suburbs and are extremely efficient, the system probably being the best in the country. The various steam railroads, which have over 1500 miles of track within the city limits, offer additional transportation facilities; and a belt line, encircling the city on three sides, affords intercommunication between the many lines and serves to unify the entire system.

The business centre is found largely in the South Division and extends from the river south to Twelfth Street. It contains the passenger stations of several railroads, administration buildings, hotels, banks, commercial houses, Board of Trade, theatres, the newspapers, and the "skyscrapers," which have made of the Chicago office buildings an architectural type. State, Clark, Dearborn, La Salle, Market, and Madison streets and Fifth and Wabash avenues are typical business streets, Adams and Market streets being prominent centres of the wholesale dry-goods interests and State Street the centre of the retail trade. In Chicago there has been a noteworthy development of the department store, establishments here ranking among the largest and most complete in the United States. Manufacturing establishments are found in various parts of the city, while the great live-stock and packing industry centres in the famous Union Stock Yards, 475 acres in extent, some 5 miles southwest of the City Hall. On the waterways, among the objects of particular interest are the great grain elevators, of which there are 30 or more. The produce markets, South Water Street throughout its whole length of a mile, and Haymarket Square on the west side, present scenes of great animation in the early hours of the day.


CHICAGO
AND VICINITY
SCALE OF STATUTE MILES
0 1 2 3 4 5 6
SCALE OF KILOMETERS
0 1 2 3 4 5
Railroads shown thus
LAKE MICHIGAN
WHEELING
NORTHFIELD
NEW TRIER
Wilmette
Mt. Prospect
Des Plaines
Evanston
South Evanston
Northwestern University
Greenwood Ave. Sta.
Morton Grove
Niles Centre
MAINE
NILES
Riverview
Park Ridge
Orchard Place
Edison Park
Rogers Park
Calvary Cem.
Birchwood Sta.
Crawford Ave. Sta.
Edgebrook Sta.
Highlands
Edgewater Sta.
Fairview or Cornish Pk.
NORWOOD PARK
Jefferson Park
Sheridan Park
Belmont Ave. Sta.
Lincoln Ave. Sta.
Addison St. Sta.
Irving Park
Grayland Sta.
Hayes Sta.
Maplewood
Ashland Ave. Sta.
Deering
Lincoln Park
Rhodes
Galewood Station
Elmhurst
West Harwood
Central Grove
Thatcher Park
Melrose Park Sta.
South Elmhurst
Bellwood Sta.
Hillside
Broadview
Woodlawn
Grant Locomotive Works
Douglas Park
Crawford Sta.
Halsted St. Sta.
Oakley Sta.
Union Stock Yards
Kenwood Sta.
Madison Park Sta.
Hyde Park Sta.
South Park Sta.
Jackson Park
Woodlawn Pk. Sta.
South Shore Sta.
Windsor Park Sta.
Cheltenham Sta.
Cheltenham Beach
Calumet Harbor
Calumet Park
Colehour Sta.
Pullman Jct.
Burnside Sta.
Pullman
Roseland
W. Roseland
Washington Heights
Morgan Park
Beverly Hills
Longwood
Evergreen Pk. Sta.
Oak Lawn
Pleasant Hill
St. Marie
Willow Springs
South Mt. Forest
Mount Forest
Seafield
Tiedtville
Chicago Ridge
Worth
Calumet Sag Channel
Sag
Conlers
McClaughrey
Wireton
Blue Island
Riverdale
Calumet City
Dolton
New Chicago
Greenwood
Calumet R.
East Chicago
INDIANA
Hammond
Whiting
Lake Calumet
Lake Michigan
Harvey
Berger
Rexford
Dupont
Golselville
Orland
WILL CO.
CORLAND
BREMEN
WORTH
PALOS
LEMONT
DOWNERS GROVE
LYONS
STICKNEY
PROVISO
LEYDEN
ELK GROVE
ADDISON
CALUMET
CICERO
Chicago Transfer and Clearing Co.
Hawthorne Race Track
Stock Yards
Chicago Lawn
Englewood
Hamilton Park
Ogden Park
Washington Park
Grand Crossing
Morgell Park
Glendale Sta.
Hayford Sta.
McCaffrey Sta.
Edgemoor Sta.
Clarkdale
Summit
McCook
Fullersburg
Western Springs
Hinsdale
Highlands
Lagrange
Grossdale
Riverside
Salt Creek
Des Plaines R.
Chicago Sanitary and Ship Canal
Illinois and Michigan Canal
Calumet Feeder Canal
Little Calumet R.
Grand Trunk Western R.R.
Chicago, Rock Island & Pacific R.R.
Ill. Cen. Depot
City Hall
Grant Park
22nd St. Sta.
27th St. Sta.
31st St. Sta.
Douglas Sta.
Oakland Sta.
Kensington
Roseland
Beverly Hills
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DOWNERS GROVE
LYONS
STICKNEY
PROVISO
LEYDEN
ELK GROVE
ADDISON
CALUMET
CICERO
L.L. POATES CO., N.Y.

The streets, with few exceptions, cross at right angles and are generally wide, some of the boulevards being 120 feet in width. Some of the long thoroughfares, notably Western Avenue and Halsted Street, nearly equal the length of the city. There are over 4000 miles of streets and alleys, over 1400 of which are paved, principally with wooden blocks, macadam, and asphalt, the mileage of the last-named material having increased rapidly in the last few years. Most of the main avenues are parallel with the lake. Of these, the Lake Shore Drive, Michigan, Drexel, and Grand boulevards, Prairie and Calumet avenues, Lincoln Parkway, Rush and Cass streets, and La Salle Avenue, with Washington and Jackson boulevards running east and west, are conspicuous representatives of Chicago's more attractive residence avenues.

Detached houses mark the purely residence districts, which, together with the more recently acquired suburban areas where rural conditions to some extent still prevail, and the magnificent parks and boulevards of the public-park system, are noticeable in contrast with the congested business area, with its noise, dust, and smoke, and numerous tall office buildings. Of these varying mammoth structures, the tallest reaches 22 stories in height, and the largest has a capacity of 6000 tenants. They are constructed of a structural steel frame with an exterior shell of masonry, generally of granite, limestone, or terra cotta. For some time a municipal ordinance limited the height of buildings to 150 feet, but this restriction was removed in 1902. Under a building ordinance, passed in February, 1911, the limit of height is established at 200 feet.

Buildings. In the centre of the business quarter, and covering an entire square, is the Courthouse and City Hall—a magnificent twin building of limestone, with fine granite columns, in a free rendering of French Renaissance, erected at a cost of $10,000,000, i.e., $5,000,000 for each of the structures. The east half is used for county purposes and the west half by the city. On La Salle Street, running south from the City Hall, are some of the finest office buildings. The Chamber of Commerce, one of the finest commercial structures in the world, costing more than $1,000,000, is 14 stories high, with a great central court roofed by an immense skylight and a richly furnished interior. The Temple, of French-Gothic architecture, 13 stories high, consists of two great wings united by a narrow vinculum, forming interior courts which admit light and air. The first two stories are faced with red granite, the rest with red brick; and near the Monroe Street entrance is the "Willard Fountain," adorned with a bronze figure. The Rookery, a Romanesque building of granite, brick, and terra cotta, contains 600 offices. The Board of Trade, at the foot of La Salle Street, is a massive granite building. Other large structures on La Salle Street are the Tacoma, the Association, New York Life, the Northern Trust, the Otis, the Corn Exchange Bank, the Continental and Commercial Bank, the Borland, the Home Insurance buildings, and the Illinois Trust and Savings Bank, one of the finest banking edifices in the city.

The Federal Building, 16 stories high, covers an entire block, 321 by 396 feet, bounded by Adams, Jackson, Dearborn, and Clark streets. The structure is of granite and steel and is surmounted by a great dome, 297 feet in height, the interior of which rises 139 feet from the floor to the "eye." The original appropriation for the building was $4,000,000, and, in 1903, $750,000 additional was voted by Congress to finish the interior.

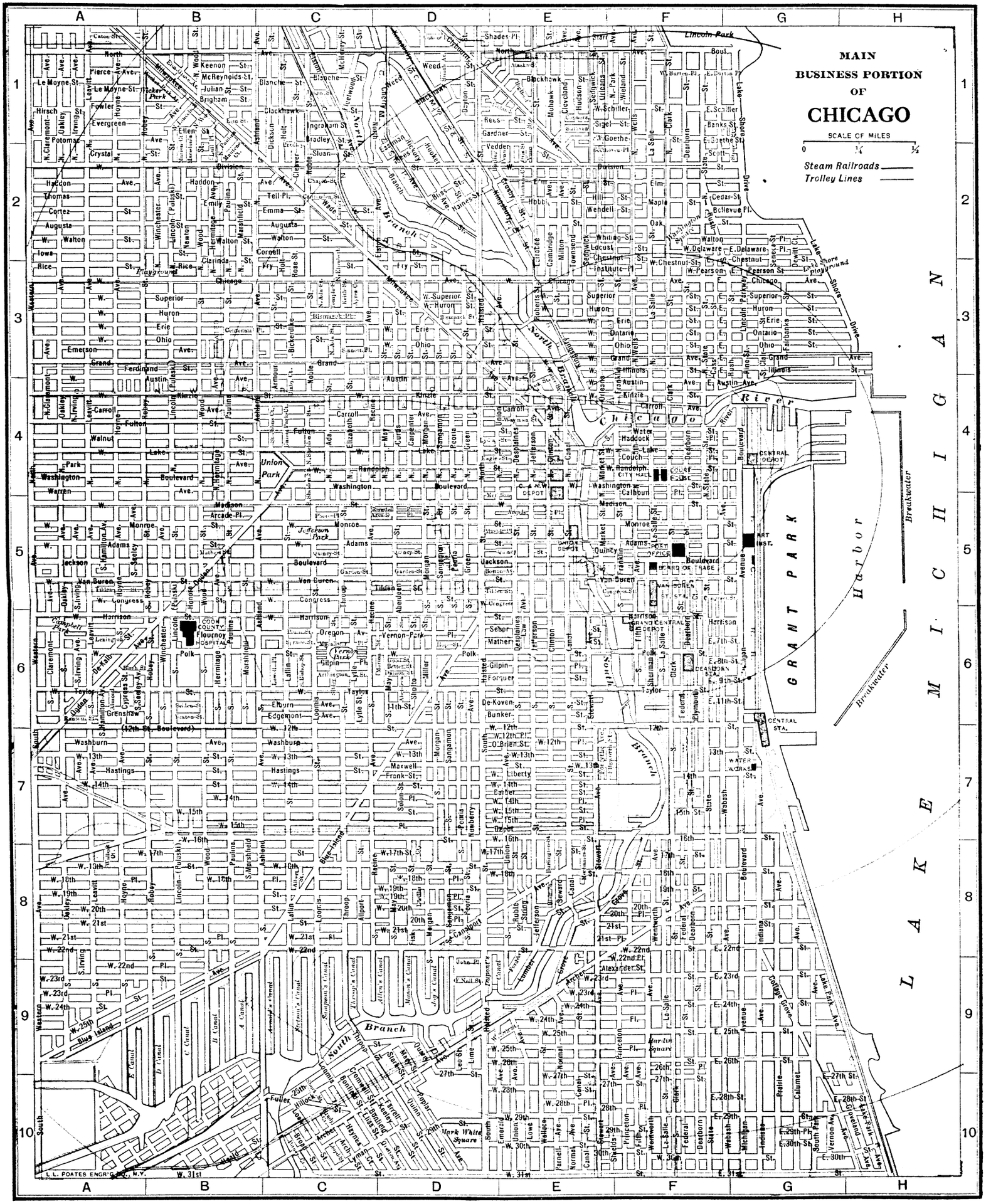
In this vicinity are four great buildings, 16 stories high: the Great Northern Hotel and Theatre, the Monon, the Manhattan, and the Monadnock, costing $3,000,000, constructed of steel and finished in granite and marble. Next to the last is the Union League Club, one of the most handsomely appointed clubhouses in Chicago. West of the Federal Building, on Adams Street, is the wholesale establishment of Marshall Field and Company, designed by the eminent Boston architect, Henry H. Richardson—of note as a more attractive type of the commercial building wherein purely commercial utility is not preëminent. At the corner of Monroe and Dearborn streets is the First National Bank, containing one of the largest banking rooms in the world. Dearborn Street is the site of many tall structures, among which the Unity, Hartford, Marquette, Old Colony, Fisher, and Transportation buildings are prominent. Situated on one of the most busy corners in the heart of Chicago is the 17-story building of the Chicago *Tribune*, one of the best examples of the growth of the æsthetic in Chicago. It is in the Italian style, being attractively built of Bedford stone, gray pressed brick, and terra-cotta trimmings. The corridors are floored in mosaics with marble wainscoting. The woodwork is in mahogany throughout, and the floors of the office portions of the building are of polished oak. On State Street is the Spanish Renaissance Columbus Building, completed in 1893, at a cost of $800,000. It is 14 stories high, with a tower 240 feet high, tipped with a globe of opalescent glass, lighted by a powerful electric light. Over the entrance is a bronze statue of Columbus, and in the interior are two glass mosaics depicting scenes in his life. The retail house of Marshall Field and Company, on State, Washington, and Randolph streets and Wabash Avenue, represents the climax of Chicago's great commercial buildings. The entire block, situated as above described, is occupied with this structure, besides a 20-story building on the south side of Washington Street opposite the main building and connected with it by a subway. This gives a total floor space for store purposes of about 44 acres, an area far in excess of any other store building in the world. The buildings are supported by foundations of concrete columns resting on bed rock 110 feet below the surface. On one corner of Randolph Street is the Masonic Temple, the highest building in the city except the tower of the Montgomery Ward Building, mentioned below. Other structures of interest are the Fair, a building 190 by 350 feet and 180 feet high, with a floor space of 677,500 square feet; the building of Siegel, Cooper, and Company, which affords 542,700 square feet floor space; the Title and Trust Company Building, 16 stories high, which contains offices occupied mainly by lawyers; the Venetian and Reliance buildings, the latter occupied almost entirely by physicians, the Merchants' Loan and Trust Company Building, a 12-story structure of granite, finished in mahogany and marble; the publishing house of A. C. McClurg and Company; the Kimball Hall Building, a musical centre with 200 studios, a music hall, and two recital halls;

the Schiller Building, containing the Garrick Theatre and halls, clubrooms, and offices; the Ashland Block; the Insurance Exchange; the Harris Trust Building; and the building of the Central Trust Company, four stories in height, at the front of which are placed four huge Corinthian columns, rising 50 feet from sidewalk to architrave.

On Michigan Avenue and Congress Street is the Auditorium, built at a cost of $3,500,000, of granite and brick, 10 stories high, and extending, on the longest front, 360 feet. It contains a large hotel facing the lake, and a beautiful theatre. The tower commands a magnificent view from its height of 270 feet. The main entrance, on Congress Street, leads through a beautiful court, splendidly decorated and with an elaborate mosaic floor, to the grand staircase of marble and bronze. The theatre, which seats 3700 persons, is luxuriously furnished and decorated with attractive mural paintings. The Fine Arts Building, Michigan Boulevard, is a centre of artistic, literary, and educational interests. It contains three auditoriums—Studebaker Hall, with a seating capacity of 1330; University Hall, with 703 seats; and an assembly room. North of it is the splendid Romanesque Chicago Club House, and farther north the building erected, and for many years owned and occupied for business purposes, by the late A. Montgomery Ward, with a tower which rises above its roof to a height of 394 feet, the highest point in the city. Upon its summit is the bronze figure of a goddess, 22½ feet high and weighing 2500 pounds, made to revolve freely on a ball-bearing shaft and serving the purpose of a weather vane. Opposite the end of Adams Street, fronting on Michigan Boulevard, is the Art Institute, the only structure that is permitted to occupy space in Grant Park. It has a frontage of 320 feet, is built of Bedford limestone, and is fireproof. The style is Italian Renaissance, the details classic. The institution, dating from 1866, was known previous to 1882 as the Chicago Academy of Design. It contains a library and lecture hall and collections of great value, some of which are loaned, including paintings, sculptures (both originals and reproductions), textiles, and antiquities. Adjoining the institute, overlooking the park towards the south, is the "Great Lakes Fountain" by Lorado Taft, completed in 1913. It consists of five figures, each representing one of the Great Lakes and holding a vase from which descends a stream of water into the basin below. Connected with the institute is a school of art instruction. The average annual attendance of visitors for some years has been upward of 700,000. On the opposite side of the avenue, to the north, is the magnificent structure of the Chicago Public Library, built in 1893–97. It is a successful rendering of the classic type of architecture and cost $2,125,000. The interior is enriched with Siena and Carrara marble, with 10,000 square feet of glass mosaic, and with beautiful frescoes and inscriptions. The library contained in May, 1913, 514,000 volumes, though it can provide for a much greater number. There are 17 branches located in different parts of the city, two of which are housed in splendid buildings. One is the Blackstone Library, the other the Hiram Kelly Library, both being gifts to the city. The delivery room of the main library is 134 by 48 feet in size. In 1912 the library circulated 2,250,000 volumes. The annual expense of maintenance is about $850,000. The building contains also a large G. A. R. Memorial Hall.

On the North Side, fronting on Washington Square, is the Newberry Library, an imposing structure of steel and granite, completed in 1893. In it are contained 350,000 volumes, none of which are taken from the building. It has a priceless collection of ancient manuscripts, of music and musical literature, and its department of genealogy is the most extensive in the West. Other institutions of allied character, which have noteworthy buildings, are the Chicago Historical Society, in a stone edifice at Ontario and North Dearborn streets—the repository of a fine collection of paintings and interesting historical relics and of a valuable library; and the Chicago Academy of Sciences in Lincoln Park. The University of Chicago (see CHICAGO, UNIVERSITY OF) occupies 95 acres, bordering the Midway Plaisance between Jackson and Washington parks. The Harper Library, connected with this institution, contains about 600,000 volumes and pamphlets. The structures of the university are English Gothic in style, uniformly built of dark limestone. Other notable buildings are the Union, the Chicago and Northwestern, Dearborn, and the Grand Central Railroad stations; and among ecclesiastical edifices are the cathedral of the Holy Name (Roman Catholic), the cathedral of St. Peter and St. Paul (Protestant Episcopal), First Church of Christ (Christian Science), and the Second Presbyterian Church.

Parks. Chicago has a splendid system of public parks, covering over 4600 acres and connected by wide, level boulevards which have aided materially in making the greater Chicago an organic whole. There are about 40 parks, of which seven are of considerable extent. There are, in addition, numerous attractive playgrounds to meet the needs of great masses of children who were without convenient access to the parks. The principal parks are maintained by State funds, and are controlled by a Board of Commissioners for each division of the city, appointed by the Governor; the smaller areas are under municipal control. In the city there is a system of boulevards, aggregating in length a total of 70 miles. These include the well-known Lake Shore Drive, Sheridan Road, Diversey Avenue, and Ridge Avenue boulevards in the North Division; Humboldt, Washington, and Jackson boulevards in the West Division; Michigan Avenue, Grand, Drexel, and Garfield boulevards in the South Division. The North Side park system centres in Lincoln Park (320 acres), one of the most beautiful in the city, with attractions in the way of a zoölogical collection, conservatories, and gardens. It has also statues of Lincoln and Grant (among the most notable of the city), of Linnæus, Schiller, and La Salle, and the Ottawa Indian monuments. Of the South Side parks, Grant Park (210 acres), adjoining the business section on the east, is noteworthy, being on ground mostly reclaimed from the lake. It contains the Art Institute, the spirited equestrian statue of Logan by Saint-Gaudens, and the Rosenberg Fountain. Jackson Park (542 acres) has a world-wide reputation, having been the spacious site of the World's Columbian Exposition (q.v.), of which a few features remain, the most important being the Field Museum of Natural History. It was the Fine Arts Building of the


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BUSINESS PORTION
OF
CHICAGO
SCALE OF MILES
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Steam Railroads
Trolley Lines
LAKE MICHIGAN
Harbor
GRANT PARK
Lincoln Park
Lake Shore Drive
Breakwater
Breakwater
River
Chicago
North Branch
South Branch
Union Park
Jefferson Park
Vernon Park
Douglas Park
Campbell Park
Blue Island
Slip
Mark White Square
Garfield Park
Humboldt Park
Logan Square
Washington Square
Lincoln Park
Lake Park
Prairie Park
Playground
CENTRAL DEPOT
CITY HALL
COURT HOUSE
C. & N.W. DEPOT
ART INST.
BOARD OF TRADE
POST OFFICE
GRAND CENTRAL DEPOT
CENTRAL STA.
WATER WORKS
COOK COUNTY Flournoy HOSPITAL
Union
Michigan
Wabash
State
Dearborn
Clark
La Salle
Wells
Franklin
Orleans
Halsted
Ashland
Western
Robey
Damen
Leavitt
Oakley
Hoyne
Lincoln (Pulaski)
Paulina
Marshfield
Hermitage
Wood
Newton
Winchester
Claremont
Irving
Sawyer
Kedzie
Homan
Keeler
Central Park
Douglas
Crawford
Pulaski
Cicero
Kostner
Keeler
Kilbourn
Kildare
Laramie
Cicero
Lotus
Lavergne
Lockwood
Austin
Narragansett
Oak Park
Ridgeland
Harlem
Oak Park
Austin
Austin
Austin

lums, and homes, day nurseries, reformatories, and relief societies. One of the most interesting institutions is the Armour Mission (nonsectarian), the object of which is industrial, mental, and religious training. It is maintained as a memorial to Mr. Joseph Armour. The oldest and most influential of the social settlements of the city is Hull House, modeled after Toynbee Hall, London, and situated in the slum and Ghetto district on the West Side. Next in order of importance are Chicago Commons, also on the West Side; Northwestern University settlement, in the northwestern section of the city; and the University of Chicago settlement, in the stockyards district. These settlements are contiguous to or are surrounded by foreign colonies. The Chicago Bureau of Justice employs legal talent in aiding the poor to recover just wage claims. The Bureau of Associated Charities carries on a worthy work by means of its summer camps and outings; and the Chicago Charity Organization Society, made up of representatives from the various allied organizations, exercises to some extent a centralized power by virtue of its general supervision.

Theatres, Clubs, Hotels. There are numerous first-class theatres and places of amusement in Chicago. The leading playhouses are the Auditorium, Majestic, Garrick, Star and Garter, Orchestra Hall, Bush Temple, Chicago Opera House, Grand Opera House, Illinois, McVicker's, Powers's, and the Studebaker.

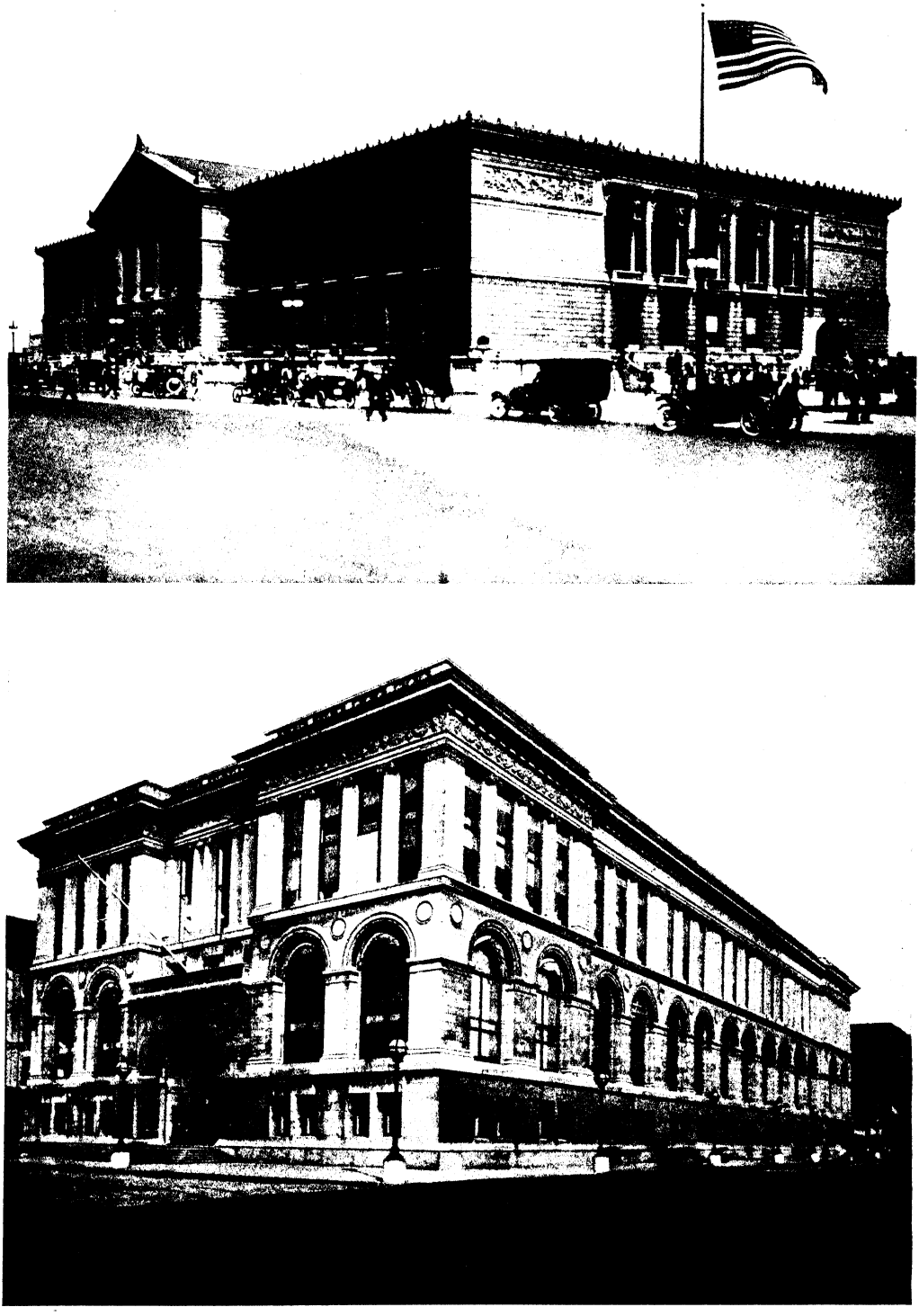
The leading clubs are the Chicago Athletic, Calumet, Illinois, Illinois Athletic, City, Hamilton, Chicago Yacht, Commercial, University, Cliff Dwellers, Iroquois, Standard, Union League, the Chicago Woman's Club, and the Woman's Athletic Club. The Calumet, Chicago, Chicago Athletic, Illinois Athletic, Union League, Hamilton, City, and University clubs have handsome and well-appointed clubhouses.

Chicago is known as a great convention city. Its hotel accommodations, which were increased considerably for the World's Fair, are very extensive. Among the most prominent hotels are the Auditorium, the Great Northern, Metropole, Palmer House, Grand Pacific, Wellington, Lexington, Victoria, Virginia, La Salle, Blackstone, Morrison, Transit, Chicago Beach, Windermere, Briggs, Majestic, New Brevoort, Stratford, Congress, and the Sherman House.

Newspapers and Periodicals. The newspaper and periodical press of Chicago occupies a high position in the publishing interests of the country, both in the number of its issues and the widespread influence exercised by its conductors. There were upwards of 700 newspapers and periodicals published in Chicago in 1914. More than a quarter of the whole number are devoted to the interests of trades and industries; altogether they cover a broad field of news and knowledge. A large proportion of the weeklies and monthlies, and about half of the dailies, are printed in foreign languages. There were in 1914 about 40 dailies, the leading ones being as follows: the *Tribune*, with a daily circulation of 261,000 and a Sunday circulation of 406,000; the *American*, daily 409,000; the *Daily News*, daily 346,000; the *Examiner*, daily 204,000, Sunday 503,000; the *Record-Herald* (later the Chicago *Herald* after consolidation with the *Inter-Ocean*), daily 173,000, Sunday 218,000; the *Evening Journal*, daily 137,000; the *Evening Post*, daily 65,000; the *Socialist*, daily 61,000; the *Farmers' and Drovers' Journal*, daily 50,000; and the *Jewish Courier*, daily (except Saturday) 30,000, Sunday 33,000. The leading dailies printed in foreign languages are: the *Staats Zeitung*, daily 40,000, weekly 30,000; the *Abendpost*, daily 47,000; the *Freie Presse*, daily 42,000; the *Skandinaven*, daily 25,000, Sunday and semi-weekly 70,000; the *Abend Presse*, daily 22,000; and the *Polish News*, daily 15,000. The journal enjoying the largest circulation was the *Woman's World*, a monthly, with 2,095,000 subscribers.

Commerce and Industry. The secret of Chicago's rapid development is found in its commanding position relative to an extensive and phenomenally productive region. Situated near the south end of Lake Michigan, the city enjoys the navigable facilities of the Great Lakes, while the railways crossing the country from the East to the Northwest and the West generally and naturally touch here. The Southern lines, connecting with the Great Lakes, also find it a natural terminal point. Chicago, the greatest railway centre of the United States, is therefore of first importance as a collecting and distributing centre. Of the 1400 trains entering the city not one passes through it; Chicago is the absolute terminal of every railroad train that enters it. The numerous railways converging in and tributary to the city operate 120,000 miles of line, one-half of the total mileage of the United States. These connections reach every State of the Union, also Canada and Mexico. The railways are supplemented, too, by lake navigation. Lines of steamers for the conveyance of passengers and freight connect with all the ports of the five Great Lakes. The number of vessels arriving at Chicago in 1912 was 5751, carrying about 8,500,000 tons of freight, of which about 55 per cent was iron ore from Lake Superior for the great steel mills in the southern part of the city. The clearances represented about the same amount of tonnage, consisting for the most part of wheat, corn, oats, and oil. The number of vessels arriving and clearing from the port of Chicago has greatly diminished in the period which has elapsed since 1890, though the tonnage has greatly increased. This is owing to the larger size of the lake craft employed in the carrying trade at the present day, many of the great "freighters" exceeding 600 feet in length. As long ago as 1870 nearly 13,000 lake vessels arrived and about the same number cleared in that year, but the tonnage, both coming and going, was only about one-third of the tonnage for 1912. The wharves along the banks of the Chicago River present a deserted appearance as compared with their aspect when throngs of smaller craft frequented the port a generation ago. In former years the shipping interests at Chicago greatly desired to engage in direct foreign commerce. A steamer with a cargo of wheat was dispatched to Liverpool in 1856, but the venture did not prove profitable, and no attempts have since been made to continue the practice. In the course of the few years following the voyage above referred to, three sailing vessels arrived from European ports at different times, but while great enthusiasm was aroused when they came, in no case were their visits repeated, and the dream of the people, that an ocean and lake commerce in unbroken shipments would be established, has entirely faded away.

The port of Chicago owes much to the presence of rivers. The mouth of the Chicago River, formerly a sluggish bayou, has been deepened by piers that extend into the lake, leaving an



CHICAGO

THE ART INSTITUTE (UPPER)
THE PUBLIC LIBRARY (LOWER)

entrance way about 500 feet wide; while long breakwaters on the east and far to the north and south, constructed by the United States government, form an outer harbor with an average depth of 21 feet and an area which is constantly varying as the extensive filling operations proceed along the city front. Additional protection to vessels is given by an exterior breakwater, which extends in a northeasterly direction about a mile from the river's mouth. In South Chicago, at the northern mouth of Calumet River, is another harbor, 300 feet wide between piers. The Illinois and Michigan Canal, constructed in 1836–48, connecting the Chicago River with the Mississippi and its affluents, extends to La Salle, the head of navigation on the Illinois. It is 96 miles in length, and its cost was $6,469,000, while its total earnings during the period of its usefulness were slightly in excess of that sum. The canal has now been practically abandoned, but during its construction period and for many years thereafter it was a large factor in the development of the city's commercial prosperity.

The largest part of the foreign exports consists of grain (wheat, corn, and oats) and packing-house products, though it is all transshipped at the seaboard for ocean passage. The largest lake import is lumber. For over 40 years the annual imports of lumber have exceeded 1,000,000,000 feet, and in the year 1913 they reached a total of 2,700,000,000 feet. About two-fifths of this import has been, in turn, shipped to other points. The imports of grain in 1912 amounted to 322,000,000 bushels (including 8,100,000 barrels of flour reduced to wheat bushels), while the exports reached a total of 244,000,000. Imports and exports of barley have fluctuated widely in recent years, the receipts in 1912 being 20,000,000 bushels (they were 29,000,000 in 1909), and the shipments only 3,500,000, thus showing a large local consumption. For the decade ending with 1912 the annual importation of hogs averaged over 7,500,000 head, and of cattle over 3,000,000. There has been recently a large increase in the importation of butter and dairy products—the imports of butter for 1912 being about 288,000,000 pounds.

According to the census of 1910 the manufactured products in the previous year reached a total value of $1,281,171,000, and there were 293,977 wage earners employed, an increase of about 33 per cent during the decade. A large percentage of the live stock received in Chicago is slaughtered and packed there, the total value of cattle, hogs, and sheep received in 1909 amounting to $358,493,000. For two decades the average number of hogs packed annually has been about 6,000,000 head. This is about one-fifth of the total number packed in the West during that period. Over 32,000 men are employed in the industry. Every part of the slaughtered animal is utilized, the value of the more important by-products, such as soap and tallow, alone amounting to $25,000,000. Leather tanning reaches a total of over $13,000,000.

The convenient location of Chicago with respect to the coal fields of Illinois and the iron-ore regions of Lake Superior is naturally utilized. The iron and steel products in 1909 reached a value of $46,000,000, while the foundry products amounted to $90,000,000. Chicago is a centre for the manufacture of harvesting machines. The capital employed in the agricultural-implement industry in 1909 was $140,000,000, under the control of one corporation, the International Harvester Company. There are extensive manufactures of lumber, the value of the manufactures of furniture being placed at $20,512,000, and the lumber and planing mills products at $32,709,000. The railway products, principally cars for steam and electric railways, amounted in value to $39,000,000. Chicago is the leading clothing manufacturing centre of the West, the total product in 1909 exceeding $85,000,000 for men's clothing and $15,600,000 for women's. A like position is held in the printing and publishing business, this output in 1909 being given at over $74,000,000. There is also a long list of other important manufactures, among which may be mentioned bakery products, value $27,000,000; electrical machinery, $20,600,000; coffees and spices, $19,600,000; paints, $19,000,000; sheet iron and copper, $12,200,000; pianos and organs, $11,500,000; confectionery, $11,000,000; and patent medicines, $10,000,000.

Government. Chicago is governed by a general Act of the Legislature passed in 1875, and by such subsequent acts as have in some measure modified the original act. The council is unicameral, with 70 elected members, there being two from each of the 35 wards. An elected mayor presides at the meetings of the council, and has a vote in case of a tie. Some of the powers vested in the council have been delegated by it to special departments, e.g., the police department. These departments are in the hands of single commissioners, who are appointed by the mayor, and whose terms of office expire with the term of the mayor (four years). The mayor is further fortified with the power to remove these commissioners, but such act may be disapproved by a two-thirds vote of the council. The legislative function of the school department is intrusted to a board of education of 21 members, appointed by the mayor and confirmed by the council. The members are appointed for two years and serve without pay. Civil-service methods prevail in the administration of city affairs, the regulations being made by the State Civil-Service Commission. Owing to prohibitive legislation, the township and county governments still exist. Township officers are elected in town meetings, and the county elects a board of commissioners. These organizations are an important factor in the financial affairs of the city.

The city owns and operates its water-works system and electric-light plant. The water supply is obtained from Lake Michigan, cribs having been located at a distance of from 2 to 4 miles from the shore, in order to secure uncontaminated water. It is conveyed to the city by means of underground tunnels. Further to preserve the purity of the water supply the municipality constructed the greatest sanitary engineering work of the country, the Chicago Drainage Canal (q.v.).

Finance. The per-capita receipts and expenditures of Chicago are low when compared with those of other large cities, and it suffers from inadequate funds, as the State constitution places a limit upon tax rates. In 1898 a new revenue law was passed, creating a board of assessors which levies assessments for the entire County of Cook. Subsequent legislation abolished the numerous offices of town collectors and made the county treasurer ex-officio collec-

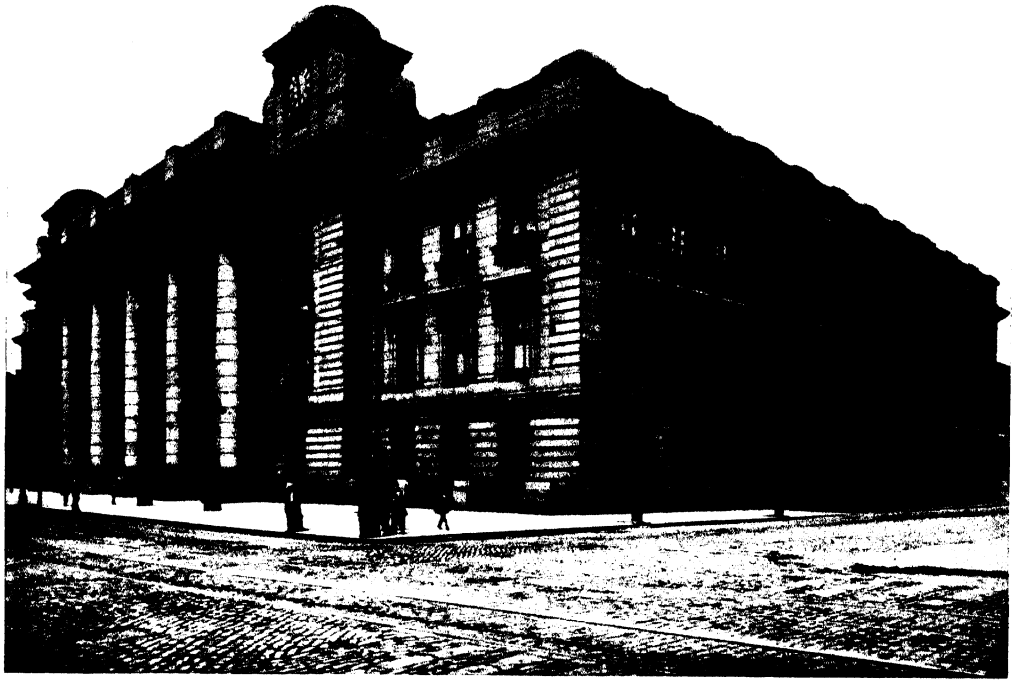
tor for all the towns. The municipality is compelled to resort in an unusual degree to indirect taxes—such as licenses, fees, fines, etc. Property, real and personal, was assessed on the basis of 20 per cent of its full value from 1898 to 1909, but after the latter date the rate was fixed at one-third. On this basis the total valuation of real and personal property in Chicago for 1913 was $981,788,078. The budgets are determined by committees of the council. The public debt in 1912 was $25,784,586. The following are the principal items of the receipts and expenditures, according to the report of the city comptroller for 1912: the receipts aggregated $54,248,546, of which $22,137,527 was from property tax; $6,828,600 from liquor licenses; $6,530,057 from the water works; and $1,616,955 from franchise compensations. The total expenditures were $56,339,734, of which those for schools were $15,318,088; for water works, $6,888,763; special assessment fund, $5,925,979; sinking funds, $2,743,771; and the balance, $25,463,133, for general corporate purposes. There are certain items of county and township government not herein included, e.g., the county maintains the charitable institutions, certain courts, jails, various public boards, the offices of the sheriff, recorder, coroner, and election commissioners, at a total annual cost for 1913 of $11,728,919.

Population. With but 4479 inhabitants in 1840, the city had increased in 1870 to 298,977, ranking fifth among American cities; in 1880, to 503,185, ranking fourth; in 1890, to 1,099,850, standing second; in 1900, to 1,698,575, and in 1910, to 2,185,283, still holding second place. The city *Directory* estimate for 1913 is 2,388,500. Greater New York alone had as great an absolute growth during the last decade. Chicago's phenomenal growth seems quite natural, however, when compared with the development of the "Great West," of which it is a part. Chicago has a remarkably high per cent (36) of foreign-born population, and of the native-born 54 per cent are of foreign parentage. Of the foreign nationalities the Germans are most numerous, aggregating more than twice the number of Irish, the latter having shown an inclination to remain in the Eastern towns. The numbers of those who are of foreign birth or parentage are given in the following list after the names of the countries from whence they were derived: Germany, 501,832; Austria, 227,958; Ireland, 204,821; England and Scotland, 85,894; Canada, 66,453; Russia, 184,757; Scandinavian countries, 184,747; and various other countries of Europe, 303,909; making a total under this classification (exclusive of Canadians) of 1,693,918, i.e., about 77½ per cent of the entire population of the city. The negro population is given at 44,103. Chicago possesses a climate subject to sudden changes of temperature, though seldom remaining long at either extreme, the extreme heat of summer and the cold of winter being tempered by the waters bordering the city. The average annual temperature for the decade ending in 1913 ranged from 48° to 50°. The death rate per 1000 for 1913 was 15.3, a ratio which has held fairly constant for 15 years, placing the city about midway in the death rates of 50 leading American cities.

History. The name "Chicago" is probably derived from an Indian word meaning "wild onion," a plant which grows abundantly in this locality. Before the coming of the whites the place was a rendezvous for various Indian tribes and a favorite meeting place for voyageurs and traders. In 1673 Joliet and Marquette on a voyage of discovery visited this spot, and the latter spent most of the winter of 1674–75 here. Later the locality was visited by La Salle, Hennepin, Tonty, and others; and on a map published by Franquelin at Quebec in 1684, the name "Chekagou" was applied to a river placed some distance west of the real location of the Chicago River. Later maps show the name in proper position. The name "Chicago" came to be applied to the region lying contiguous to the river, and for over a century and a half after its discovery Chicago was an important outpost on the frontier where traders and savages met. During that period Chicago existed under three flags—first, under the domination of the French, when after the fall of Quebec it passed into the possession of the English. As British territory it remained until the close of the Revolutionary War, when the Western territories were ceded by the English to the United States. It has been said that "Chicago is the oldest Indian town in the West of which the original name is retained."

Jean Baptiste Point de Saible, a native of San Domingo, who came about 1779, built a house which was later known as the Kinzie house and which remained in existence over half a century. In 1796 he sold his cabin to Le Mai, a French fur trader, who in turn sold out early in 1804 to John Kinzie, the first white man to make his home here. The military importance of the place was quickly recognized by the government, which in 1795 forced the Indians to cede a tract of land "six miles square at the mouth of the Chicago River," and late in 1803 erected Fort Dearborn (q.v.) on the south bank of the river, near its mouth. On Aug. 15, 1812, in accordance with orders, Captain Heald and the garrison evacuated this fort, but were ambushed by their Potawatomi escorts and other Indians, and 38 soldiers, two women, and 12 children were killed, and many others captured. On the following day the fort was burned, but it was rebuilt in 1816. In 1830 the town was laid out, and the first map, dated August 4, gives its area as three-eighths of a square mile. There were then 12 families here, besides the garrison. Three years later Chicago was incorporated as a town, its population being 550, and its area 560 acres; and on March 4, 1837, then having 4479 inhabitants, it was chartered as a city. In 1833, 5000 Indians assembled here and sold a large tract of land in this vicinity, agreeing to move across the Mississippi.

The Illinois and Michigan Canal, begun in 1836, was finished in 1848; and in the same year the first railroad, the Galena and Chicago Union, was completed a few miles towards the west. Four years later the Michigan Southern and the Michigan Central, the first roads leading to the East, entered the city, which from this time grew with unprecedented rapidity. In 1860 the Republican National Convention, by which Lincoln was nominated, was held in Chicago. In October, 1871, one of the most destructive fires in the history of the country occurred here. Breaking out in a barn in De Koven Street and fanned by a gale, it spread with the greatest rapidity and raged uncontrolled for two days and nights, sweeping over 2100 acres, destroying 17,450 buildings, and causing 200 deaths, besides the greatest destitution and suffering. Out of





CHICAGO

CHICAGO AND NORTH WESTERN RAILWAY STATION (UPPER)
MICHIGAN AVENUE (LOWER)

a population of 324,000, more than 70,000 were rendered homeless, and almost one-third of the property in the city ($190,000,000 out of $575,000,000) was destroyed. Relief poured in from all sides, and within a year the city was largely rebuilt.

In July, 1877, the railroad riots, caused by discontented laborers, necessitated the calling out of militia and United States troops, and in May, 1886, occurred the celebrated "Haymarket riots" (q.v.), consequent upon the labor troubles of 1885–86. On May 4, while the police were attempting to break up an anarchist meeting, a bomb was thrown among them, and 27 of their number were wounded, of whom seven subsequently died. In 1893 the Great World's Fair (see WORLD'S COLUMBIAN EXPOSITION) was held here. In 1894 a large number of laborers went on a strike, destroying property valued at $1,000,000 and again making it necessary to call out the militia and Federal soldiery. In 1904 and 1905 street traffic was seriously affected by a strike of the city teamsters.

The Mueller law, enabling the city to acquire, own, lease, construct, and operate street railways, provided that the electorate should decide by referendum vote upon questions of this nature, was passed in 1903, as a result of popular discontent with prevailing conditions. For municipal operation a two-thirds majority was made a prerequisite; a simple majority was made sufficient to authorize municipal ownership. In 1905 both mayoralty candidates were pledged to municipal ownership—the Democratic candidate, Edward F. Dunne (q.v.), promising immediate municipalization; the Republican candidate favoring a temporary agreement with the private companies which should safeguard the interests of the city and make possible municipalization under more favorable conditions than could then be secured. Mr. Dunne was elected by a substantial majority, but opposition in the council prevented him from making material progress towards the consummation of his policy. All efforts in this direction were eventually abandoned. Meantime the street-railway service degenerated, betterments were neglected, and public discontent was rife. While the companies were clamoring for extensions of their expiring franchises, the public demanded in return a new agreement, which at length was entered into, and ratified by both parties, in April, 1907. The agreement provided that thereafter the city was to receive 55 per cent of the net receipts and be given the right to purchase the existing systems at an agreed valuation at any time upon giving six months' notice. The result was that in the years following the inauguration of this plan the city received from "franchise compensations" the sum of $10,334,199, down to the end of the year 1913. The various systems greatly enlarged their facilities and improved the roadbeds in accordance with the terms of their agreement, but they are still seriously embarrassed with the constantly swelling volume of street-passenger travel. It can now be said that Chicago possesses in many respects the most modern and complete system of street railways of any city in the world.

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CHICAGO, UNIVERSITY OF. A leading American university, situated in Chicago, Ill. The university was established at the instance of prominent Baptists throughout the country, and through gifts made chiefly by Mr. John D. Rockefeller, to replace the former University of Chicago—a Baptist institution opened in 1857, which had been obliged through lack of funds to close its doors in 1886. In recognition of the funds given by Baptists to start the new university, it was provided in the charter that while no religious tests should ever be exacted from the university professors or students, yet at all times two-thirds of the trustees, and also the president of the university, should be members of regular Baptist churches.

The university includes four divisions: first, schools, colleges, and academies; second, university extension; third, the university libraries, laboratories, and museums; fourth, the university press. The first division includes the graduate schools, of which the divinity school, the graduate school of arts and literature, the Ogden Graduate School of Science, and the law school have already been organized, while schools of medicine, technology, fine arts, and music are yet to be established. Of the schools established, the Ogden School of Science was founded under the will of William B. Ogden, his executors alloting to Chicago 70 per cent of the moneys he devised to charities. The divinity school was established under an agreement of the university made in 1891 with the Baptist Theological Union of Chicago, by which its seminary became the divinity school of the university. The colleges of the university include the colleges of arts, literature, science, commerce and administration, the university college, and the college of education. There were, in 1913, 404 secondary schools in coöperation with the university, these schools being allowed to send their graduates upon certificate and without examination. In the department of university extension the attempt is made to bring the university to those who cannot come to it. Lecture and study courses are given, and work done in them is on certain conditions recognized and credited by the university. The correspondence courses are definitely arranged in majors and minors, according to the regular university schedule, and on them credits are allowed, on certain conditions, towards the university degrees. The university libraries in July, 1913, contained 402,000 volumes, bound and catalogued, besides about 130,000 volumes uncatalogued and about 200,000 pamphlets. Of the total number about 217,000 volumes were in the general library and the remainder in the various departmental libraries. The acquisitions by purchase, gift, and exchange, in 1912–13, numbered about 52,000 volumes. The laboratories and museums include: The Kent Chemical Laboratory, Ryerson Physical Laboratory, Psychological Laboratory, the Yerkes Astronomical Observatory, the Walker Museum, Haskell Oriental Museum (including biblical, comparative religion, Syrian, and Egyptian collections), and the Hull biological laboratories (including the zoölogical, physiological, anatomical, and botan-

ical laboratories). The university press publishes both separate books and pamphlets and departmental journals. The departmental journals are as follows: *The Journal of Political Economy; The American Journal of Sociology; American Journal of Semitic Languages and Literatures; Biblical World; The Astrophysical Journal; Journal of Geology; School Review; Botanical Gazette; American Journal of Theology; The Elementary School Teacher; Modern Philology;* and *The University of Chicago Magazine; Weekly Calendar and Classical Philology.* Under the head of separate publications the university press issues many important pamphlets and books written by professors or postgraduate students in the course of specialized university work, and others.

The arrangement of courses at the University of Chicago is unique among American universities. The academic year consists of four quarters, and these four quarters, equally divided, complete the calendar as well as the scholastic year. Instruction is arranged with a single quarter of 12 weeks as the unit, instead of taking for the unit the scholastic year. Students are permitted to drop or take up university work at the beginning of any quarter, and a degree is given whenever the requisite amount of courses, computed by units, has been completed. The courses are arranged by majors and minors, according to the group system, and the student is required to take courses in definite groups. This system has the advantage of eradicating such artificial barriers to obtaining an education as are likely to follow from continuous courses of nine months each and from arbitrarily required studies. The degrees conferred by the university are: A.B., Ph.B., B.S., LL.B., A.M., Ph.M., M.S., J.D., Ph.D., B.D., D.D., LL.D. Bachelors' degrees are given upon completion of work in the senior colleges of the university. Chicago, however, has also junior colleges, and graduation from these entitles the students to the title of associate in arts, philosophy, or science. The work of the junior colleges is roughly equivalent to the work ordinarily done in the best American colleges in the freshman and sophomore years. The title is given on the completion of this work, mainly to give recognition to such students as are for any reason unable to complete the course.

The University of Chicago has grown with extraordinary rapidity since it was first opened to students in 1892. This growth has been made possible by many large gifts. Of the benefactors of the college should be especially mentioned: John D. Rockefeller, whose gifts have amounted to about $35,000,000; Marshall Field, who gave the original site for the university; S. A. Kent, Silas B. Cobb, Martin A. Ryerson, Charles T. Yerkes, Miss Helen Culver, Mrs. Annie Hitchcock, Mrs. Elizabeth G. Kelly, Julius Rosenwald, La Verne Noyes, and Mrs. Anita McCormick Blaine. The present buildings of the university, which have been erected almost entirely from private donations, include Cobb Lecture Hall, Kent Chemical Laboratory, Walker Museum, Ryerson Physical Laboratory, Haskell Oriental Museum, Law School, Bartlett Gymnasium, Mandel Hall, Reynolds Club (for men), Hutchinson Dining Hall (for men), School of Education, a group of graduate and divinity dormitories, Snell Hall and Hitchcock Hall (for men), Beecher, Kelly, and Nancy Foster halls for women, four biological laboratories (comprising the Charles J. Hull group), 1896–97; Yerkes Observatory, Lake Geneva, 1897; Green Hall (for women), 1898, and the Harper Memorial Library (1911–12). As shown by the president's report, the general assets of the university on June 30, 1913, amounted to $31,055,420.10, of which $18,690,563.66 represented investments, and the remainder buildings, grounds, and equipments. The current expenditures for the year previous had amounted to $1,738,610.57. In 1912–13 the total number of students, excluding duplicates, entered was 6802. These students were distributed as follows: divinity school, 359; graduate schools, 1737; the colleges, 3822; medical school, 219; school of education, 1018; law school, 286.

The president of the university from its foundation in 1891 until 1906 was William Rainey Harper (q.v.), Ph.D., D.D., LL.D., who, previous to his succession to the presidency of the University of Chicago, was professor of Semitic and biblical literature in Yale University and principal of the Chautauqua system. Harry Pratt Judson, LL.D., was made acting president in 1906 and president in 1907. The administrative and scholastic methods of the university were largely molded by Dr. Harper, and a large measure of the university's immediate success is ascribed to his influence and to his efforts in its upbuilding. Under President Judson's administration the financial resources have doubled, and the increase in the attendance of students has been very pronounced.

CHICAGO DRAINAGE CANAL. A canal constructed under an Act of the Illinois Legislature, dated May 29, 1889. The object of the canal is to reverse the flow of the Chicago River. After being in use for several years it was deemed necessary, with the growing population of southern Chicago and the near-by city of Gary in Indiana, to make similar provision for the flow of the Calumet River. Accordingly a smaller (the Calumet-Sag) canal, about 16 miles in length and 20 feet in depth, capable of carrying 2000 cubic feet per second and connecting this stream with the main Chicago Drainage Canal near Sag Bridge, was put under construction in 1912 at an estimated cost of $11,000,000 for excavation and connected works. The aim of the original canal was to divert the sewage-laden contents from the city's water supply, Lake Michigan, to the Mississippi, by way of the Des Plaines River, and also, if possible, to furnish a waterway from the Great Lakes to the Gulf of Mexico. Construction was begun Sept. 3, 1892, and the canal formally opened Jan. 2, 1900. Cost, $33,000,000; length, 40 miles. The work consisted of four parts: (1) deepening and widening the Chicago River from its mouth to Robey Street, 5.3 miles; (2) constructing the canal proper from Robey Street to Lockport on the Des Plaines River, 28.05 miles; (3) diverting this river into a new channel; (4) constructing a tail race and a new channel between Lockport and Joliet, 7.1 miles; size of canal, 160 feet bottom width in rock and 110 to 202 in earth; top width, 162 feet in rock and 200 to 300 feet in soil; minimum depth, 22 feet; capacity, 20,000 cubic feet per minute per 100,000 of population, or about 360,000 cubic feet per minute. The controlling works are located at Lockport and consist of a bear-trap dam 160 feet wide, and 7 sluice gates, 30 feet wide. In September, 1903, it was decided to utilize the 35,000 horse power being

UNIVERSITY OF CHICAGO



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wasted at the controlling works, by means of turbines, and to this end construction estimated at $3,000,000 was begun. At first it was feared that the turning of Chicago's sewage into the Mississippi from which St. Louis is supplied would result in an increase of typhoid and other water-borne diseases there, but chemical and bacteriological examinations failed to verify this. That Chicago benefited from a sanitary standpoint was shown by the report of the commissioner of health for August, 1904, which gave a comparison of water-borne diseases for a period of four years previous to and after the opening of the canal. Acute intestinal diseases, 1896–1900, 16.41 per 1000 of population; 1900–04, 12.44 per 1000. Typhoid fever, 1896–1900, 3.68 per 1000; 1900–04, 3.10 per 1000.

The question whether the taking of water from Lake Michigan affected navigation and the interests of States and cities on the Great Lakes was one that was seriously discussed and involved much litigation and investigation. The Chicago Sanitary Canal had never received the direct sanction of Congress. The authority to derive water from Lake Michigan was granted by Secretary of War Alger on May 8, 1899, and he permitted a flowage of 5000 cubic feet per second under certain restrictions and subject to any future action by Congress. Secretary of War Root, on Dec. 5, 1901, fixed the amount at 4167 cubic feet per second, and on March 14, 1907, Secretary of War Taft denied the application for an additional 4000 cubic feet per second for the purpose of reversing the current of the Calumet River and flowing that river also through the canal to drain the southern portion of Chicago. Subsequently the proposals to take as much as 10,000 cubic feet per second from Lake Michigan were opposed both by the Chief of Engineers of the United States Army and by an International Waterways Commission, in session in 1906, on the ground that this would interfere substantially with the navigable capacity of the Great Lakes and their connecting rivers by lowering the level of the lake. Furthermore, a treaty of Jan. 11, 1909, between the United States and Canada was believed to stand in the way of any considerable or additional diversion of water from the Great Lakes. Accordingly, on Jan. 8, 1913, the application to the War Department, on the part of the sanitary district of Chicago charged with the control and operation of the canal, was formally denied by Secretary of War Henry L. Stimson. While the Chicago Drainage Canal was a prime necessity to the city of Chicago, as was also, with the growth of the city to the south, the reversal and drainage of the Calumet River then in progress of construction (1913), yet its relations to commerce and international comity were also important. Notwithstanding the granting of limited permission for this work by the Secretary of War in 1910, the right of the city to reverse the flow of the river was pending in the United States Circuit Court in 1913. The possibilities of the canal, in addition to sanitation and the incidental power developed, as a commercial route were also considered, and it was thought possible that with the various improvements in progress the canal could be made an important link in a commercial waterway from the lakes to the gulf. If that were done, it would not solve the question of diversion of water, inasmuch as for the proper dilution and handling of sewage a considerable volume would be required, whereas in even a fairly large barge canal there would be no need of an active current or excessive drafts from the lake once the prism was filled.

CHICAGO HEIGHTS. A city in Cook Co., Ill., 27 miles south of Chicago, on the Chicago and Eastern Illinois, the Elgin, Joliet, and Eastern, and the Michigan Central railroads (Map: Illinois, E 2). It has a Carnegie library and a hospital. Manufacturing is extensively carried on; the most important products are iron and steel goods, chemicals, glass, carriages, lumber, fireproofing materials, automobiles, passenger and freight cars, linseed oil, clothing, pianos, blackboards, globes, and brick. Chicago Heights was settled in 1835 and was chartered as a city in 1900. The water works are owned by the municipality. Pop., 1900, 5100; 1910, 14,525.

CHICAGO JUNCTION. A village in Huron Co., Ohio, 62 miles (direct) west-southwest of Cleveland, on the Baltimore and Ohio Railroad (Map: Ohio, E 3). Chicago Junction is essentially a railroad centre and contains large repair shops of the Baltimore and Ohio system. Lumber is manufactured also. The water works and lighting plant are municipally owned, and the village is known for its fine sulphur water. Pop., 1900, 2348; 1910, 2950.

CHICAGO ORCHESTRA. A permanent orchestra, founded by Theodore Thomas in 1891 and conducted by him until his death in 1905. Its name was then changed to "The Theodore Thomas Orchestra." In 1913 the original name "The Chicago Symphony Orchestra" was again adopted. The present conductor is Frederick A. Stock, who faithfully follows the ideals of the great founder. During the season concerts are given on Saturday nights and Friday afternoons. The rates of admission are designedly moderate, the deficit at the close of the season being periodically met by the guarantors of the association, a number of public-spirited citizens. The organization formerly consisted of about 60 players, but in 1901 the number was increased to 90. A strict adherence to the highest classic ideals and an unswerving refusal to be influenced by local criticism or financial exigencies at first caused considerable friction, but the annually decreasing deficit and the greatly increased attendance have amply justified the course of Mr. Thomas. Orchestra Hall, the permanent home of the organization, was built by popular subscription and opened in December, 1904. The opening concerts were the last Mr. Thomas conducted.

CHICAGO RIVER. A navigable stream in the city of Chicago, which formerly emptied into Lake Michigan, but the direction of whose current has been reversed by the construction of the Chicago Drainage Canal. It is formed by two branches, the North Fork and the South Fork, and it is less than a mile from this junction to Lake Michigan (Map: Chicago, F 7). Nearly 4 miles from the main river, the south branch separates into a west fork and a south fork. The Illinois and Michigan Canal connects the Chicago River at Bridgeport with the Illinois River at La Salle, a distance of nearly 100 miles, and during 1893–1900 the Chicago Drainage Canal (q.v.) was constructed, connecting the west fork of the south branch and Joliet, on the Des Plaines River, the distance being 28.05 miles. See CHICAGO.

CHICHAGOV, chē-chä'gôf, PAVEL VASSILIEVITCH (1765–1849). A Russian admiral. He

served under his father, Vasili Yakovlevitch (1726–1809), a Russian admiral, and completed his studies in England (1792–93). As head of the navy, to which he was appointed in 1802 by Alexander I, he greatly promoted the efficiency of the service. In 1811 he was appointed a member of the Imperial Council, and the year following received an important military command. Failing to prevent Napoleon's recrossing the Beresina, he fell into disgrace and left Russia. His *Memoirs* (1886–88) are valuable.

CHICHÉN-ITZÁ, chī-chän'ē-tzä' (Maya, mouth of the wells of the Itzá). The most important of the ancient ruined cities of Yucatan, Mexico, situated 18 miles southwest of the town of Valladolid in the northern part of the peninsula. It derives its compound name from its former occupants, the Itzá tribe of the great Mayan stock, and from two remarkable natural pools or wells, still existing, which undoubtedly furnished the water supply of the ancient inhabitants and may have determined the original selection of the site. According to tradition preserved in the *Books of Chilán Balám* (q.v.), Chichén-Itzá was founded about 450 A.D. and abandoned for the first time about 600. It was rebuilt about 900 and for 300 years was the most important city in northern Yucatan. Towards the end of this time it became involved in war and was apparently held for a time by foreign invaders from the highlands of Mexico. It was abandoned 100 years or more before the coming of the Spaniards, but was still an important place of pilgrimage.

The principal ruins, which were first described in detail by Stephens in 1843 (*Incidents of Travel in Yucatan*), cover an area of about one square mile, with smaller edifices scattered about the encircling forest. The general structural type is that of the platform pyramid, ascended by means of broad stairways leading up to vaulted chambers, whose walls are covered with sculptured figures and hieroglyphic inscriptions or vividly colored paintings resembling those of the Aztec codices. The material is the white limestone of the country, and the walls consist of a composition of mortar and broken stone faced with neatly cut stone. Each prominent structure is known to the natives under a distinct name. One of the most interesting is that denominated the "Tennis Court" or "Ball Court." It consists of two immense parallel walls, each 274 feet long and 30 feet thick and standing 120 feet apart. Projecting from the centre of each, at the height of 25 feet from the ground, is a sculptured ring of stone, representing two entwined serpents. From contemporary Spanish descriptions it is certain that this was a courtyard, devoted to the playing of a favorite game, in which the effort was made to send the ball through the stone ring fixed in the wall. Another of the important ruins is the "Castillo," a pyramidal mound 200 feet square at the base and rising 75 feet to a platform, the approach being by means of a grand staircase with two colossal serpents' heads in sculptured stone at the base. The Palace, or Nunnery (*Casa de las Monjas*), is a rectangular mass more than 100 feet long and somewhat less in width, with an L-shaped wing on the eastern side, 60 feet long. Resting on this artificial platform, which is over 30 feet high, is a rectangular structure 90 feet long, 18 feet wide, and 18 feet in height; and this, in turn, is crowned by a smaller edifice 30 feet long by 12 feet wide. The L-shaped wing is a specimen of the best Mayan architecture. Minor ruins are the Caracol, or Round Tower, the Clichanchob, or Red House, and the Temples of the Tables, the Tigers, and the Cones. Consult: Holmes, *Archæological Studies in Ancient Cities of Mexico* (Chicago, 1895); Maudslay, "Biologia Centrali-America," *Archæology*, vol. iii, and Spinden, *Maya Art* (Cambridge, 1912).

CHICHESTER, chĭch'es-tĕr (AS. *Cissanceaster*, Lat. *Cissæ castrum*, camp of Cissa). A municipal borough and episcopal city in Sussex, England, 17½ miles east-northeast of Portsmouth (Map: England, F 6). It is well built and has wide streets. The ancient city walls are now utilized as a public promenade. The cathedral, erected in the twelfth and thirteenth centuries, is remarkable for its unique features of double aisles and detached campanile. Other notable public buildings are the guildhall, formerly the church of a Franciscan monastery; the church of St. Olave, one of the oldest in Chichester; the market cross, erected by Bishop Story about the beginning of the sixteenth century, and counted one of the finest examples of the Perpendicular style in England; and St. Mary's Almshouse, which was founded as a nunnery in the twelfth century. The town has a theological college, and there is an ancient grammar school founded in 1497. The chief trade is in agricultural products and live stock. There are malting, brewing, and tanning establishments and manufactures of wooden ware. The harbor, 2 miles to the southwest of the city, is a deep inlet of the English Channel, about 8 square miles in area, and is connected with Chichester by a canal. Chichester was perhaps the Roman Regnum, or Regni. It was taken and partially destroyed in 491 by the South Saxons, but was soon afterward rebuilt by Cissa, their King. It was for some time the capital of the Kingdom of Sussex, and was incorporated in 1213. During the Civil War it was taken in succession by Royalists and Parliamentarians. Pop., 1901, 12,200; 1911, 12,591. Consult: Hills, "Chichester Cathedral" in *Archæological Journal*, vol. xx (London, 1864), and "The City Walls" in id., vol. xlii (London, 1886); Hay, *History of Chichester* (Chichester, 1804).

CHICHEVACHE, shēsh'vāsh'. A creature in French fable, represented as a lean cow, which lived upon submissive wives. The name and the conception arose from the corruption of the old French *chichefact* ('ugly face') to *chichevache* ('lean cow'). Bicorne, the complement of Chichevache, is a fat beast, nourished on submissive husbands.

CHICHIMECA, chē'chē-mā'kȧ (Aztec, perhaps from *chichiltic*, red + *mecayotl*, race). "Dog people," a term of contempt anciently applied by the more cultured Aztecs to the wild tribes northward of the valley of Mexico. The name has no ethnic significance whatever.

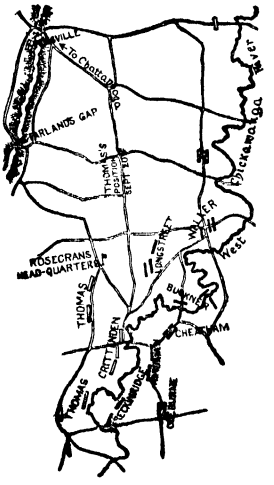
CHICK'ADEE'. See TITMOUSE.

CHICK'AHOM'INY (Algonquian *k'chick-aham-min-nough*, coarse-pounded-corn people). A river in Virginia, about 75 miles long, flowing into the James about 40 miles southeast of Richmond. On and near this river occurred, during the Civil War, the battles of Seven Pines or Fair Oaks, Mechanicsville, Gaines's Mill or Cold Harbor, Savage's Station, Frazier's Farm, Malvern Hill, and the second battle of Cold Harbor (qq.v.). The first of these engagements was fought on May 31 and June 1, 1862. The battle of Mechanicsville took place on June 26,

1862, and the last of the seven days' battles, that of Malvern Hill, on July 1. The second battle of Cold Harbor was fought on June 3, 1864. See SEVEN DAYS' BATTLES, THE.

CHICK'AMAU'GA, chĭk'ȧ-mą'gȧ. A creek in the extreme northwestern part of Georgia and in southern Tennessee. It is a tributary of the Tennessee River, into which it empties a few miles above Chattanooga. It is famous on account of the battle of Chickamauga, Sept. 19–20, 1863.

CHICKAMAUGA, BATTLE OF. One of the most hotly contested battles of the Civil War, sometimes called "the Great Battle of the West." It was fought Sept. 19, and 20, 1863, near Chickamauga Creek, about 12 miles east of Chattanooga, Tenn., between a Federal army of 55,000, under General Rosecrans (q.v.), and a Confederate army of 70,000, under General Bragg (q.v.). Manœuvred out of Chattanooga (September 8) by the brilliant strategy of Rosecrans, Bragg had started in apparent retreat towards the south and had been followed by Rosecrans, whose troops, forced to cross the mountains at widely separated points, were scattered over a great extent of territory. Soon perceiving that the Confederate retreat was only apparent and fearing an attack in detail, Rosecrans rapidly concentrated his forces and, by shifting Thomas to the extreme left (September 18), thwarted an attempt by Bragg to attain his rear and shut him off from Chattanooga. At 9 A.M. on the 19th the battle began with a fierce attack by the Confederate right, under General Polk, on the Federal left; but Thomas held his ground, and the day ended without decisive advantage to either side. The fighting was renewed early on the 20th and was proceeding with varying fortune, when, in pursuance of a misinterpreted order from Rosecrans, a division was withdrawn from the Federal right. This made a gap in the line of battle through which Longstreet, commanding the Confederate left, poured his troops, soon routing the Federal right and centre (under McCook and Crittenden respectively) and driving them in wild disorder back towards Chattanooga. The whole Confederate army was now massed against the Federal left; but Thomas stood firm against tremendous odds throughout the day, gallantly repulsing attack after attack and inflicting great damage on the enemy. His remarkable courage and skillful generalship alone saved the whole Federal army from meeting with an overwhelming defeat and earned for him the title of "The Rock of Chickamauga." During the night, under orders from Rosecrans, he retired to Rossville and on the 21st withdrew behind the fortifications of Chattanooga. The Federal army lost 16,179 in killed, wounded, and missing; the Confederate, about 17,800. Though the battle was won by Bragg, Chattanooga, the prize for which it was fought, remained in the possession of Rosecrans. Consult: *Official Records,* vol. xxx (Washington, 1890); Cist, *The Army of the Cumberland* (New York, 1882); Johnson and Buel (eds.), *Battles and Leaders of the Civil War* (4 vols., New York, 1887).



CHICKAMAUGA.

CHICKAMAUGA NATIONAL MILITARY PARK. A park in Georgia, situated on the site of the battle of Chickamauga, a few miles southeast of Chattanooga, Tenn., near the Tennessee and Georgia line. It was established under the authority of Congress, with the cooperation of those two States. The legal boundaries embrace a compact area of 15 square miles, which cover the main scene of the battle; but there have also been secured several small neighboring tracts which are the sites of events of special military interest. It is the object, so far as possible, to preserve the conditions as they existed at the time of the battle, and, in order to make clear the positions and movements of the troops engaged, monuments, historical tablets, and other guide marks have been set up at the proper points. Several lofty observation towers have been erected, which command a view of the battlefield. A large part of the park is forest land, but a considerable portion has been cleared of underbrush and small timber, in order to permit free access and unobstructed views. In addition to acquiring these lands, the Federal government has obtained a concession of many miles of approaching roadways which have been beautified. Congress appropriated $725,000 for this work, and the States have given $400,000 additional. The park was dedicated Sept. 19–21, 1895. It is the first time that a battlefield has been so completely marked and set aside as a monument of the event which happened within its boundary.

CHICK'AREE (imitation of its cry), or HACKEE. Old book names of the North American red squirrel. See SQUIRREL.

CHICK'ASAW. An important Muskhogean tribe, formerly occupying northern Mississippi and the adjacent part of Tennessee, and later settled in the western part of Oklahoma with an autonomous government, under the name of the "Chickasaw Nation." They are now citizens of the United States. Originally they were a restless and warlike people, and throughout the Colonial period adhered to the English side as against the French, who tried repeatedly, but without success, to subdue them. From the close of the Revolution they maintained friendly relations with the United States. In 1832 they sold all their remaining lands east of the Mississippi and agreed to remove to their present location. They joined the Confederacy during the Civil War and at its close were obliged to free their slaves and admit them to equal Chickasaw citizenship. Those of pure and mixed Chickasaw blood now number 4204.

CHICKASAW BLUFFS, or **BAYOU,** bī'o͞o, BATTLE OF. A battle fought, Dec. 29, 1862, between a Federal force under General Sherman and a Confederate force under General Pemberton, strongly intrenched on the bluffs above Chickasaw Bayou, the Federals being repulsed with great loss. It was the result of an attempt by Sherman to attain the rear of Vicksburg, by way of Yazoo River, with a view to coöperating with General Grant in his operations against that city. (See VICKSBURG, CAMPAIGN AGAINST.) The

Federal loss in killed, wounded, and missing was almost 2000; the Confederate, less than 200. An interesting account of the engagement is given in Sherman, *Memoirs* (2 vols., New York, 1888).

CHICKASHA, chĭk'ă-shā. A city and the county seat of Grady Co., Okla., 48 miles southwest of Oklahoma City, on the Chicago, Rock Island, and Pacific, the Frisco Lines, and the Oklahoma Central railroads, and on the Washita River (Map: Oklahoma, D 3). It is the seat of a State college for women, contains a Carnegie library, and has machine shops, cottonseed-oil mills, flour mills, and large stock-feeding pens. The water works and sewage system are owned by the municipality. Pop., 1910, 10,320.

CHICKEN. See FOWL.

CHICKEN BIRD, or **CHICKEN PLOVER.** The turnstone.

CHICKEN CHOLERA. See FOWL CHOLERA.

CHICKEN FLEA. See CHIGOE.

CHICKEN LICE. See FOWL; LOUSE.

CHICKEN POX, or VARICELLA (Neo-Lat., from *variola*, smallpox, from Lat. *varius*, spotted). 1. An acute contagious disease, chiefly of children. It is characterized by early fever, an eruption of papules and vesicles, with mild constitutional disturbance. In most cases fever is present 24 hours before the eruption appears. The eruption comes out in crops, on the face, scalp, or shoulders, as red, widely scattered papules, spreading slowly over the body, one crop maturing while another is appearing. Thus red papules, blebs filled with clear fluid, and crusts are found at the same time in a small area. Pitting is rare and generally occurs on the face, where the lesions are apt to become infected with pus germs. Chicken pox is extremely contagious, but very rarely dangerous. Complications or serious sequelæ are rare. Erysipelas, gangrene, inflammation of glands, abscesses, or kidney disease may occur. Isolation of cases is necessary till all crusts separate and fall off. Chicken pox bears no relation to smallpox and is unaffected by vaccination. While the two diseases differ in all essential characteristics, mild cases of smallpox may easily be mistaken for varicella and severe cases of the latter for smallpox. 2. A disease of fowls, chickens, turkeys, pheasants, peacocks, pigeons, and, much less commonly, waterfowls, caused by a filterable virus and characterized by the formation on the comb, ears, wattles, and other unfeathered parts of the body, of small nodules. These nodules, which may develop to the size of a pea, are sometimes so abundant that they coalesce. There are several clinical forms of the disease to be differentiated. The mortality is said to vary from 50 to 70 per cent of the affected birds. Treatment consists in the local application of ointments and antiseptics. Diseased fowls should be isolated at once and dead birds destroyed. Consult Hutyra and Marek, *Pathology and Therapeutics of the Diseases of Domestic Animals*, and E. W. Hoare, *A System of Veterinary Medicine*, vol. i.

CHICKEN SNAKE. 1. A very slender harmless snake, the southeastern representative of our northern pilot black snake (*Coluber absoletus quadrivittatus*), about 6 or 7 feet long, yellowish brown, with a straw-colored head, tail, and abdomen, and two brown stripes along each side of the body. It is common from South Carolina to Florida and Alabama and often enters buildings in search of mice and young poultry and is sometimes known as the "four-lined snake." 2. In the Northern States, the milk snake (q.v.).

CHICKEN TORTOISE, tôr'tŭs *or* -tĭs, or **CHICKEN TURTLE.** One of the edible "painted" turtles (*Chrysemys reticulatus*) of the southern United States.

CHICK'ERING, JONAS (1797–1853). A piano maker, born at New Ipswich, N. H. In 1818 he became a workman in John Osborne's piano manufactory, a business in which he subsequently became a partner and finally (1823) sole proprietor. Under his management the firm developed into one of the largest piano manufactories in the United States, with an output at the time of his death of 2000 pianos yearly. His three sons continued the business. Consult *The Commemoration of the Founding of the House of Chickering and Sons* (Boston, 1904).

CHICK'LING VETCH. See LATHYRUS.

CHICK'-PEA' (corruption of *chich-pea*, from OF. *chiche*, from Lat. *cicer*, chick + Eng. *pea*). A plant of the genus *Cicer*, of the family Leguminosæ, having pinnate leaves, solitary axillary stalked flowers, and two-seeded pods, inflated like bladders. The common chick-pea (*Cicer arietinum*) is a native of southern Europe. It is an annual, 1½ to 2 feet high, of a stiff, upright habit, covered with glandular hairs. The seeds abound in starch and have a slightly bitterish taste. They are about the size of common peas and resemble in appearance a ram's head; hence the specific name. The ripe seeds are eaten either boiled entire or made into pea soup. They are sometimes roasted as a substitute for coffee. A red-seeded variety is extensively grown in the East, both for table and for stock food.

CHICK'WEED'. A name applied to a number of species of *Stellaria*, a genus of the family Caryophyllaceæ. One of the most common weeds of gardens and cultivated fields is a species called also "stitchwort," or "starwort" (*Stellaria media*). It is a native of most parts of Europe and of Asia, appearing during the colder months even on the plains of India, and has been abundantly introduced in America and elsewhere. It is an annual, with a weak procumbent stem and ovate leaves, very variable, but always characterized by having the stem curiously marked with one or two lines of hairs. The leaves of chickweed afford a fine instance of the "sleep of plants," in that they close up on the young shoots at night. Although generally regarded as a troublesome weed, chickweed is used for feeding cage birds. It is a good substitute for spinach or greens. A number of species of a nearly allied genus, *Cerastium*, also bear the name of "chickweed," or "mouse-ear chickweed," and the name is occasionally given to other allied plants, as *Holosteum umbellatum*, introduced into the United States from Europe and called "jagged chickweed."

CHICLANA-DE-LA-FRONTERA, chē-klä'-nä-dā-lä-frôn-tä'rä. A town of Andalusia, Spain, about 12 miles southeast of Cadiz (Map: Spain, B 4). It is pleasantly situated on the Lirio and has manufactures of linen, earthenware, and brandy. Its mineral baths are much frequented by the inhabitants of Cadiz. Pop., 1900, 10,868; 1910, 11,496.

CHICLAYO, chē-klä'yō. A town in the Department of Lambayeque, Peru, situated in a sugar-growing plain near the coast (Map: Peru, B 5). It is the residence of a United States consular agent. Pop., 13,000.

CHICLE. See CHEWING GUM.

CHICO, chē'kō (Sp., small). A city in Butte Co., Cal., 96 miles north of Sacramento, on the Southern Pacific and the Butte County railroads and on Chico Creek (Map: California, D 3). It has a State normal school, a Carnegie library, and a natural park, 2000 acres in extent. The city has important fruit-growing, dairying, lumbering, and mining interests. The industries include the plant of the Diamond Match Company, flour mills, foundries and machine shops, electric-car shops, etc. Pop., 1900, 2640; 1910, 3750.

CHICOMOZTOC, chīk-ō'mŏs-tōk' (Nahuatl, seven caves). The mythical birthplace of the Nahuatl race, in Aztec legend.

CHICOPEE, chīk'ō-pē. A city in Hampden Co., Mass., 3 miles north of Springfield, on the east bank of the Connecticut River, at the mouth of the Chicopee, and on the Boston and Maine Railroad (Map: Massachusetts, B 3). By means of several dams abundant water power is derived from the Chicopee River for the variety of manufactures for which the city is noted. These include firearms, cotton and knit goods, rubber tires, automobiles, knitting machines, agricultural implements, bronze statuary, swords, machine and mechanics' tools, carpets, counting scales, drop forgings, athletic goods, and many other articles. The city contains a large public library and has municipal water works and a lighting plant. The government is vested in a mayor and a council with various administrative departments. Pop., 1890, 14,050; 1900, 19,167; 1910, 25,461.

Settled about 1675, Chicopee was incorporated as a town in 1848, including the villages of Chicopee Falls, Fairview, and Willimansett, and was chartered as a city in 1890. Consult Holland, *History of Western Massachusetts* (Springfield, 1855).

CHICOPEE RIVER (N. Amer. Indian, violent water). A river formed near Three Rivers, Mass., by the junction of the Quaboag, Ware, and Swift rivers (Map: Massachusetts, B 3). It flows west and empties into the Connecticut River at Chicopee. It is 20 miles long from the mouth to Three Rivers and with the Quaboag about 50 miles. It drains an area of 700 square miles and has 28 ponds in its basin. It has a rapid fall, thus affording extensive power at Chicopee, Chicopee Falls, Ludlow, and Three Rivers. The name "Chicopee" is sometimes applied to the Quaboag branch as well.

CHICORY, chīk'ō-rĭ, or **SUC'CORY** (Fr. *chicorée,* Lat. *cichorium,* from Gk. κιχόριον, *kichorion,* chicory). A plant belonging to the genus *Cichorium,* of the family Compositæ, the same family of plants to which the sunflower, the oxeye daisy, the dandelion, the lettuce, and other useful and obnoxious plants belong. The few species are all herbaceous perennials, with spreading branches and milky juice, natives of Europe and western Asia. Chicory has become naturalized in the United States, occurring as a weed along roadsides, in fence rows, and in fields. Common chicory (*Cichorium intybus*) grows from 1 to 5 feet high. The leaves resemble those of the dandelion, but are generally larger, with the exception of those on the upper part of the stalk, which are small and inclined to be lance-shaped, and the flowers, of a beautiful blue, though sometimes pink or white, occur in heads from 1 to 1½ inches in diameter. The plant has a long, carrot-shaped root, whitish yellow or grayish yellow in color on the outside, but white within. Chicory is quite extensively cultivated in Europe for use as a table salad, for fodder, and for the roots. It is also grown to some extent for its roots in the United States. (For illustration, see SALAD PLANTS.) The young leaves, when properly blanched, are considered equal as a salad to those of endive, a plant belonging to this same genus. The young green leaves are eaten much in the same manner as spinach, and the roots, as long as they are young and tender, are also used as a food. The plant also has some merit as a forage crop. It is principally cultivated, however, for its roots, which are roasted and ground and in that form are used as a substitute for coffee and as an adulterant for coffee, snuff, and other articles. Chicory itself, however, is sometimes adulterated.

CHICOT, chē'kō, *Fr. pron.* shē'kō'. See GYMNOCLADUS.

CHICOUTIMI, shē-kōō'tē-mē'. The capital of Chicoutimi Co., Quebec, Canada, at the confluence of the Chicoutimi River with the Saguenay, and on a junction line of the Quebec and Lake St. John Railway (Map: Quebec, G 2). It is an important lumber town, with an extensive lumbering establishment and two large pulp mills. It is the see of a Roman Catholic bishopric, and has a cathedral, a classical college, convents, and sailors' hospital. The settlement dates from the Jesuit chapel built in 1670, relics of which were found during the erection of a new chapel in 1893. Pop., 1901, 3826; 1911, 5880.

CHIEF (OF. *chef,* chief, It. *capo,* from Lat. *caput,* head). In heraldry (q.v.), an honorable ordinary.

CHIEF JUSTICE. In the English and American judicial systems, the title of the presiding justice of a bench or court of judges—the terms "judge" and "justice" being identical in meaning. The presiding or superior judge of the King's (or Queen's) Bench and of the Court of Common Pleas in England has always borne this title, the former being known also as the Chief Justice of England, and ranking all other judicial officers of the kingdom except the Chancellor (q.v.). The corresponding officer of the Court of Exchequer, whose judges were known as barons, was called the Chief Baron. See BARON.

The presiding justice of the Supreme Court of the United States, and of the courts of highest jurisdiction in most of the several States, bears the title of Chief Justice or Chief Judge, as the case may be. The Chief Justice of the United States is the highest judicial officer of the Republic. Among his functions are those of administering the oath on the occasion of the inauguration of the President and Vice President, and of presiding over the Senate of the United States when that body is resolved into a high court for the trial of impeachments. The Chief Justice ranks next after the President of the United States in official dignity.

CHIEMSEE, kēm'zā'. The largest lake of Bavaria, situated in Upper Bavaria, about 42 miles southeast of Munich, at an altitude of over 1700 feet. It covers an area of about 33 square miles and is irregular in shape. The south coast is generally swampy; on the other sides the country is hilly and picturesque (Map: Germany, E 5). The tributaries of the lake are the Roth, Achen, and Prien, and its outlet is the Alz. It contains three islets; Herrenwörth, on which is the royal palace built by King Louis

II; Frauenwörth, on which is a Benedictine convent founded in 766; and Krautinsel.

CHIERI, kyā'rē (Lat. *Carea,* or *Ceara*). A city in the Province of Turin, north Italy, in a fertile, hilly country, 11 miles southeast of Turin. The most interesting churches are San Domenico, dating from 1260, and Santa Maria della Scala, from 1405. Chieri has a gymnasium, a technical school, and a theatre, and linen, cotton, and silk factories. It was a manufacturing centre as far back as 1422. In the eleventh century it was an independent republic. Pop., 1900, 14,312; 1911, 15,454.

CHIETI, kyā'tē. An archiepiscopal city in south Italy, capital of the Province of Chieti, 99 miles south of Ancona, near the Pescara (Map: Italy, J 5). It has nine churches besides the magnificent Gothic cathedral, a gymnasium, a normal school, a technical school, a seminary, a theatre, four conservatories of music, a military hospital, and a chamber of commerce. It is an important centre of trade; markets wine, oil, grain, and silk, and manufactures silk and wool. There are a few remains of the ancient Teate Marrucinorum, which was the most important city of the Sabelli and fell into the hands of the Romans 305 B.C., in the last Samnite War. It was held successively by the Goths and by the Lombards and was destroyed by Pepin the Short. It was rebuilt by the Normans, who made it the capital of the Abruzzi. From it the Order of the Theatines, founded in 1555 by Paul IV, was named. Pop., 1901, 26,000; 1910, 26,897.

CHIFF'CHAFF' (imitation of its cry). A small European warbler (*Phylloscopus collybita*), having a twittering note suggesting the name; also called "willow wren" in Great Britain, where it is common about gardens during summer.

CHI-FU or **CHEFOO,** chē'fo͞o'. A city in the Province of Shantung, China, so called by foreigners, though the Chinese name is Yen-tai, and Chi-fu proper is on the opposite side of the harbor (Map: China, F 4). Chi-fu is in lat. 37° 32' N. and long. 121° 22' E. The town was opened to foreign trade in 1858. The natives are very orderly and civil. The climate is so bracing that in summer Chi-fu, with its good hotels and boarding houses, is a much-visited sanitarium, being but two days' journey from Shanghai. The winter is severe, the spring lovely and cool, the summer hot and rainy, and the autumn perfect, with warm days, cool winds, and cold nights. Since the Chino-Japanese War Chi-fu has become a coaling station much resorted to by the navies of foreign countries. The city was the seat of the famous convention of 1876 between Sir Thomas Wade and Li Hung Chang. The trade is largely in bean cake and beans, exported mainly to ports in the southern part of China. Silk, straw braid, and vermicelli are the other chief exports. The making of wine is a promising industry. Gold mines 20 leagues away are worked by native capital. The value of the foreign trade for 1905 was over $23,287,000, of which $13,725,000 represented imports and $9,562,000 represented exports. During the investment of Port Arthur by the Japanese in 1904–05 Chi-fu was a rendezvous for blockade runners. Pop., 1910 (est.), 54,000.

CHIGGER. See CHIGOE.

CHIGI (kē'jē) **FAMILY.** An eminent Italian family, mentioned as early as the thirteenth century. AGOSTINO CHIGI, its first prominent member, was a celebrated banker, born at Siena about the year 1465. Established in Rome as early as 1485, Chigi grew immensely wealthy through banking and the possession of valuable alum mines. His income was estimated at 70,000 golden ducats a year (about $700,000). He was one of the great art patrons of the day, and the leading artists, including Peruzzi, Perugino, Sebastiano del Piombo, and, above all, Raphael, owed much to his generosity and friendship. Peruzzi built for him the famous Villa Farnese, which Raphael and Sodoma decorated with frescoes. He died in Rome in 1520. There is a good biography of him in Italian by Cugnoni, *Agostino Chigi, il magnifico* (Rome, 1881–83). Consult also Gregorovius, *Geschichte der Stadt Rom* (4th ed., 8 vols., Stuttgart, 1886–96; Eng. trans., London, 1894–1902).—FABIO CHIGI. See ALEXANDER VII, Pope, 1665–67.—FLAVIO CHIGI, Cardinal, born in 1819, was, up to the year 1848, an officer in the papal noble guard. He then took orders and became Bishop of Mira *in partibus.* In 1856 he represented the papacy at the coronation of Alexander II, Czar of Russia, and from 1861 to 1873 he was the papal nuncio in Paris. In the last-named year he was created a cardinal. Chigi was distinguished for his finesse and courtesy of bearing in all diplomatic business. He died in Rome, Feb. 15, 1885.

CHIGNECTO (shĭg-nĕk'tō) **BAY** (Micmac *sigunikt,* footcloth). The northern extension of the Bay of Fundy, partly separating Nova Scotia from New Brunswick (Map: Nova Scotia, E 3). The main portion of the bay is about 30 miles long and averages 8 to 10 miles in width; but in its northern part it separates into two narrow arms, one extending northward about 12 miles, and the other about the same distance to the northeast. Numerous towns border the bay and its extensions, and it receives several tributary streams. See also FUNDY, BAY OF.

CHIGNON, shĭn'yŏn, *Fr. pron.* shē'nyôN'. See HAIR DRESSING.

CHIGOE, chĭg'ō, **CHIGGER,** chĭg'gĕr, or **JIG'GER** (of West Indian or South American origin). 1. A species of flea (*Sarcopsylla penetrans*), rather smaller than the common flea and with less powerful limbs, found in the West Indies and South America, where it is excessively troublesome. The female insect attacks any exposed part of the human body and effects a lodgment between the skin and the flesh, often under the skin of the foot or the nails of the toes. At first its presence is indicated only by a slight itching or tingling; but this soon becomes intolerable, and an ulceration due to the development of a mass of eggs is likely soon to be the result, which is not only very painful, but even dangerous. Another species (*Sarcopsylla gallinacea*) attacks the eyelids of poultry.

2. In the southern United States the name is applied to the minute scarlet forms of various mites which attach themselves to the skin of man and other vertebrates or even burrow into it; they seek those parts of the body particularly upon which the clothing presses tightly. Their bite is very annoying, though not fatal to man; but they may collect in such numbers under the wings of newly hatched chicks as to cause death. Salt-water bathing alleviates the burning of their bites on man, and on such animals as chicks salted lard or the drippings of salted bacon soon give relief when smeared on the infested surfaces. During the Civil War the soldiers often kept a

piece of bacon with which to rub infested parts of their bodies after the day's march.

CHIHUAHUA, chē-wä'wà (Aztec, watercourse). An inland, and the largest, state of Mexico, bounded on the north by the United States, on the east by the Mexican State of Coahuila, on the south by Durango, and on the west by Sinaloa and Sonora. Area, 89,998 square miles. The surface can be divided into the two regions of an elevated plateau on the east and a mountainous section formed by the Sierra Madre on the west. Neither region is well watered. The state's chief river is the Rio Conchos, a tributary of the Rio Grande. The climate is temperate and healthful and the soil fertile wherever watered. Agricultural products consist of corn, wheat, several kinds of vegetables, and fruit, including grapes. Cotton is also grown successfully in the Torreon district. The forests are found mostly in the mountainous districts of the west. Chihuahua has considerable mineral deposits, its silver mines being among the richest in the republic. Some of them were worked by the Indians at the time of the Spanish Conquest. The state's production of lead is noteworthy. Zinc is also abundant. Over 5250 mining properties are recorded for its entire area. The state is traversed from north to south by the Mexican Central Railway. Other important lines operated within its area are: the Sierra Madre and Pacific; the Mexican Northern; the Chihuahua and Pacific, and the Kansas City, Mexico, and Orient. Pop., 1900, 327,784; 1910, 405,265. A considerable portion of the population is creole or white; the rest consists of Indians partly civilized. There are some Apaches in the mountains, who still continue their forays on the settlements. The close of the nineteenth century, however, witnessed great changes in the status of the state. Large numbers of foreigners, chiefly Americans, have secured control of the industries and have already raised the state to a leading place in the republic. A flourishing Mormon agricultural colony was founded in 1886 west of Ciudad Juarez. Capital, Chihuahua.

CHIHUAHUA. The capital of the North Mexican state of the same name, on the Mexican Central Railway (Map: Mexico, F 3). It is situated at an elevation of about 4650 feet, on the Chihuahua River, in a plain surrounded by mountains on all sides except the north, and it is regularly built, with broad, well-kept streets. It has a fine public square, in which is a monument erected to Hidalgo and his generals, the leaders of the revolution of 1810. The parish church, completed in 1789, is the most pretentious building, and other features of interest are a college, formerly belonging to the Jesuits, and an aqueduct which dates from the close of the seventeenth century. The city is the centre of a rich silver-mining district and is known also for its stock-raising and industrial interests, the cotton and woolen mills being among the most important in the republic. Fruits, particularly grapes and figs, are grown extensively in the adjacent region. A United States consulate is located here. Chihuahua was founded in 1703 or 1705, and at one time was a much larger city, its population in the late eighteenth century having reached 70,000. Pop., 1895, 18,279; 1910, 39,061.

CHIKARA, chē-kä'rà. See CHOUSINGHA.

CHIKHACHEV, chē'kà-chĕf', PETER ALEXANDROVITCH (1808–90). A Russian geologist and traveler. In 1843 (with Elie de Beaumont, Heppert, and Verneuil) he investigated the Altai Mountains, the result of these investigations being embodied in *Voyage scientifique dans l'Altaï oriental et les parties adjointes de la frontière de Chine* (1845). An attaché in the Russian Embassy at Constantinople (1845–47), he mastered Turkish and during 1848–63 traversed Asia Minor, making large geological, paleontological, archæological, zoölogical, and botanical collections. He embodied the results of his studies in *Asie Mineure* (8 vols., 1853–69). Among his other works are *Voyage dans l'Altaï Oriental* (1844–45), presenting an account and scientific interpretation of his explorations in the Orient; and *Etudes de géographie et d'histoire naturelle* (1890).

CHILÁN BALÁM, chē-län' bà-läm', BOOKS OF. The native name of a series of documents in Spanish script but Maya words preserved by the Maya Indians of Yucatan. The name refers to the priests who wrote them and means 'priestly interpreter,' or, more literally, 'tiger mouth.' The books are based on ancient records destroyed at the time of the Spanish Conquest and relate primarily to history. The count is made in 20-year periods, called "katuns," and in Chronicle I extends back to 160 A.D. The events refer primarily to the tribe of the Itzás and to the cities of Chichén Itzá, Uxmal, and Mayapan. Consult Brinton, *Maya Chronicles* (Philadelphia, 1882), for the translation, and Morley, *Am. Journ. Arch.*, vol. xv (2d series, 1911), and Spinden, *Mem. Peabody Mus.*, vol. vi (1912), for the historical value. Under the caption *The Book of Chilán Balám of Chumayel* a facsimile reproduction has recently been issued by Dr. Gordon in the "Anthrop. Series," vol. v, of the Museum of the University of Pennsylvania.

CHIL'BLAIN, or FROSTBITE. A dermatitis, or skin disease of the feet with inflammation, following exposure to the cold and to chafing or pressure in the shoes. It may affect also the fingers, the nose, chin, or cheeks. The lesion is a small oval or round patch of reddened and elevated tissue with a purplish centre. Ulceration, or even sloughing, may follow in severe cases; but in ordinary chilblain, or *pernio*, there are only itching, burning, and stinging of the spots when warm, with tenderness on pressure. Tincture of iodine, ichthyol, tincture of the chloride of iron, tincture of camphor, are all efficacious. Sweating of the feet and sudden changes of temperature should be avoided. Hosiery should be changed whenever moist. General tonic treatment and outdoor exercise should be taken. See FROSTBITE.

CHILCOTT, ELLERY CHANNING (1859–). An American agriculturist, born at East Hamburg, N. Y. From 1882 to 1892 he was United States deputy surveyor, during most of this period also owning and managing a stock ranch in Campbell Co., S. D. He became State Senator in 1892. At South Dakota Agricultural College he was professor of agriculture in 1892–97 and professor of geology and agronomy and vice director from 1897 to 1905. He was agriculturist in the United States Experiment Station, South Dakota, from 1893 to 1905, when he was placed in charge of the dry-land agricultural investigations of the Bureau of Plant Industry. He is author of *A Study of Cultivation Methods and Crop Rotations for the Great Plains Area* (1910), a bulletin of the Department of Agriculture.

CHILD, DEVELOPMENT AND GROWTH OF. The

poet calls the child "an epitome of man." Not so the scientist, who sees rather a creature very simple, yet very complex, who will, by many changes and much evolution, one day become a man. These changes are anatomical, physiological, and mental. Says Camerer, "The most interesting task in anthropology is the study of child growth."

We begin with the skeleton. Although the bones are very incomplete in development, having ends largely cartilaginous, the relative proportion to body weight is greater than in the adult, viz., 16.7 per cent. The infant bones are soft, and the larger ones are abundantly filled with red marrow, while the adult bones are

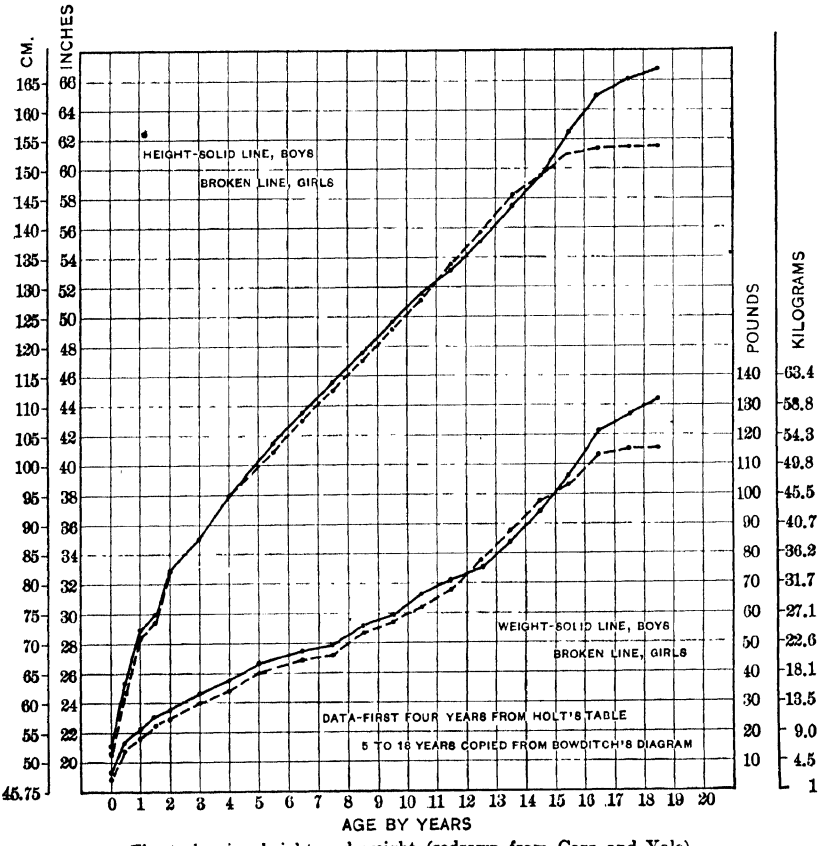


Chart showing height and weight (redrawn from Carr and Yale).

hard and filled with yellow marrow. This is significant, as the chief function of the red marrow is the formation of red blood cells, so essential to growth and good health. The infant spine is nearly straight, because of little rigidity in its many parts, the vertebræ; but, as time goes on, lime is deposited, so that the cartilage, instead of containing 2.24 per cent of salts, contains 7.29 per cent. Moreover, the cartilage largely becomes solid bone. The muscles keep pace with this development and, acting upon the limbs and trunk, bring about the curves in the small of the back and at the neck. The infant head differs much from the adult in size and in proportion—the diameter of the former exceeding the height of the face and skull, while in the adult the diameter is but half the height. The bones of the skull are imperfectly joined at birth, which allows the head to mold itself in passing through the rigid pelvis of the mother. There is an entire absence of bone at the anterior fontanelle, the soft spot on the top of the head where the parietals meet the frontal bone. This space is filled by solid bone at the age of a year and a half. If rachitis (q.v.) develops, the space becomes more than full and is knobbed and elevated.

The ribs of the young infant are more nearly horizontal than in later life; hence the barrel-like chest and abdominal breathing. The lungs until birth are collapsed, but with the first cry they are expanded by the inrushing air and never cease their function while life lasts. From now on the heart and lungs coöperate in a very intimate manner, as we shall consider later. The heart at birth is .89 of 1 per cent of the body weight, but the labor of constantly pumping causes it to grow until at maturity it has increased to 12 times its original size, and the left ventricle has become greatly thickened as compared with the right, which only forces blood through the lungs. The infant heart is comparatively small, but the arterial system is large; hence the low blood pressure. Studies by the writer showed an average blood pressure of 91 millimeters at three years, 109 millimeters at 15 years, and thence on to 120–140 millimeters, the standard in the healthy adult.

The eyes are imperfect at birth: the macula lutea is not distinct; the lens is nearly a sphere, which grows less spherical in adult life and in old age becomes flattened. The lachrymal glands for a time do not secrete tears, and the

eyes do not coördinate perfectly until the age of three months. The ears undergo considerable change: in the beginning the membrana tympani, i.e., the drum membrane, is on a plane almost horizontal, and the Eustachian tube also. Later, both assume a nearly upright position. In the flattened and patent tube we find one explanation of the ease with which children become affected with catarrhs and infections of the middle ear. At three months the child listens attentively, though it evidently can hear a month earlier.

The digestive tract is practically a long tube. The portion called the stomach is in the infant an upright dilatation, having a capacity of about an ounce and a half. There is little muscle tissue at first and therefore little sphincter action. This accounts for the ease with which infants vomit or pour out the stomach contents. By the time the child is weaned the muscle fibres have grown thick and strong, so that there is peristaltic action sufficient for other foods than milk. The rectum of the young child is straight, as its name implies, and for this reason prolapse of the bowel is common.

The lymphatic system with its glands is early in evidence, but there is more variableness in the glands having secreting functions. The parotid gland, e.g., with its starch ferment, does not functionate until the fifth month. The glands of Lieberkuhn and of Brunner in the intestine are not fully developed until needed to digest mixed diet. The thyroid and thymus glands in the neck behave very unlike—the former relatively diminishing towards adult life, while the latter practically disappears.

The liver is relatively a third larger than in the adult. In general, the liver and lungs have similar ratios of growth and also the heart and kidneys. Secretion and absorption are much influenced by blood pressure, and are normal in the growing child, but distinctly abnormal in the adult with heart or kidney disease. The suprarenal capsule is as large at birth as in the adult, although the kidney beneath will increase 15 times in size.

The blood of the infant is not so rich in hæmoglobin as is that of the adult, therefore it does not carry so much oxygen. The proportion of white cells is high, 2100 at birth and averaging 10,000 to 14,000 at six months, the latter figure being double the normal for adults. Infant blood is deficient in coagulating ferment.

The average infant at birth measures 20.5 inches in length and weighs seven and a half pounds. He has 20 years in which to become an adult in stature and in mental and moral development. Man alone has so long a period of infancy, and it has been said that "the brute pets and playmates of his childhood all die of old age before he reaches his majority."

For the first few days after birth the infant loses weight, but by the end of the first year he has reached three times his birth weight. During the second year he adds six pounds and during the next year four. Growth is not steady, there being periods of special activity, as at the time of the second dentition and a year or two before puberty. Until 12 years of age boys are both taller and heavier than girls, but after that girls assume the lead for about three years. At 14 girls cease to grow much in height, but increase in weight, with the deposit of fat characteristic of adolescence. The changes in growth and in height are clearly set forth in the accompanying chart, adapted from that of Yale and Carr, based upon studies of American children. Statistics of English children show less height and weight, while those of German children show greater.

The Development of the Faculties of the infant were carefully recorded by Preyer, from whom the following statements are mainly taken. During first month: eyes follow object on eleventh day; recognizes sound towards end of the month; first tears on the twenty-third day; begins to hear about fourth day; begins to smile. During second month: recognizes human voices, and direction from which they come; smiles when music is heard; recognizes mother; turns head towards sounds. During third month: moves arms to express pleasure; able to support head a little; listens attentively. During fourth month: eyes coördinate perfectly; reaches after objects; first attempt to sit upright. During fifth month: recognizes strangers as such; holds head straight; sits alone; moves legs as if to walk; stretches out arms to be taken. During sixth month: distinguishes faces, staring at strangers but smiling at friends; turns head towards person leaving the room; begins to creep and to "crow." During seventh month: purposive movements; points with finger at pictures; extends hand when asked; follows objects dropped from hand; associates persons and names; recognizes with pleasure its image in a mirror. During eighth month: sits upright when carried; some children attempt to walk at this time. During ninth month: begins to imitate tunes; laughs heartily; begins to beg for things. During tenth month: takes intense interest in its food; begins to walk alone; answers questions by motions and indicates where certain things are. During eleventh month: stands quite alone; pushes chairs, begins to articulate its own name; understands language fairly well. During twelfth month: imitates laughter of others; puts out arms to enforce its demands; improvement in walking and standing; watches other persons attentively. Fourteenth to sixteenth month: independent speech is acquired; repeats spoken words easily; in seventeenth month speaks short sentences, using verbs; from this time on there is steady improvement in the memory of words and the use of language; at two years repeats rhymes. Colors are distinguished before their names are learned; in fact Garbini found that only 35 per cent of children name colors at six years of age.

Speech. "Action is eloquence, and the eyes of the ignorant more eloquent than their tongues." Actions are much the same in children of all nations, and the gesture language of primitive races and of children is everywhere similar. The intelligent use of words begins at about the second year and increases in proportion to the culture and intelligence of parents or guardians. Recent records show that children have a much larger vocabulary than was formerly taught. For example, the Salisbury boy at five and a half years had 1528 carefully checked words which he "used understandingly." Children can easily acquire any language if they begin to hear it soon enough. Moreover, the natural aptitude of all races is about the same. Three boys, known to the writer—a Hottentot, a Bushman, and a Negro from an asylum—were brought up in the same mission school; they were quite like normal white boys of the same

age. Their bodies were inherited, but their language was acquired.

Teeth. At birth the teeth are in sacs buried in the gums. In six or eight months the lower central incisors come through and are followed at irregular intervals by others until the temporary set of 20 teeth is completed at 24 to 30 months. The accompanying diagram indicates the relative position of the temporary or deciduous teeth with reference to the permanent teeth, also their order and time of ruption. Order in Roman numerals, months and years in Arabic numerals.

The ruption of teeth in the healthy child is a physiological process without disturbance, but in some it is accompanied by swelling of the gums and pain.

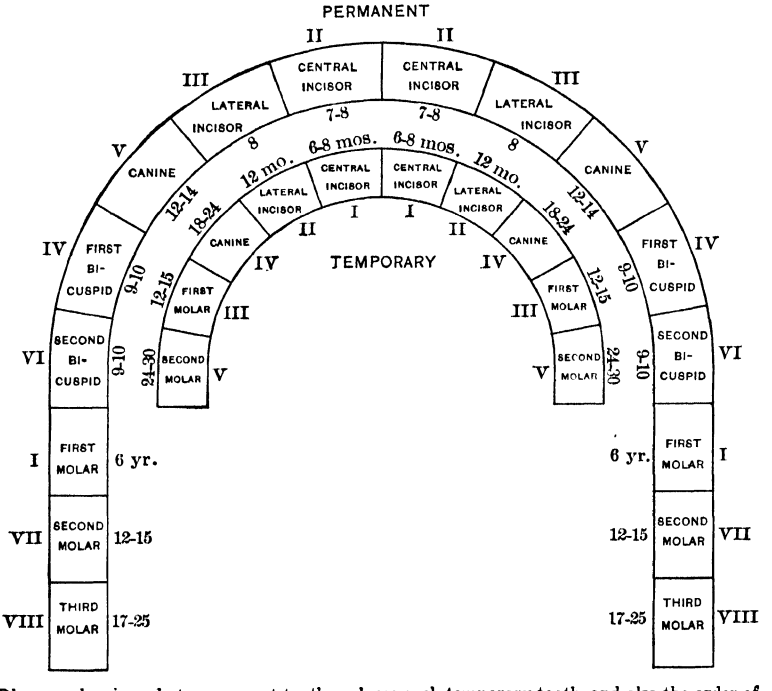


Diagram showing what permanent tooth replaces each temporary tooth, and also the order of succession of the teeth of each set, with time of ruption (in part after Gerrish).

The Brain. At birth the weight of the brain is one-sixth of the body weight, while at 20 years it is one-thirty-sixth; however, "growth is less important than development, and perfect function than either." In the development of the brain the centres first perfected are those presiding over the viscera, as the heart and lungs, then the limbs, next the centres of sensation, and lastly the centres of thought and reason. The child acquires knowledge very rapidly, at first by observing and imitating its associates; reason and conviction are developed after school age. At the adolescent period the child begins to realize that his brain is his own, and his independence may exasperate his superiors. This state passes with the approach of maturity and the realization of personal responsibility. It is said that the nerve cells are not functionally perfect until 18 or 20 years of age; therefore we should not be surprised if the young fail sometimes fully to appreciate truth, right from wrong, or exhibit those moral characteristics that adults have acquired from experience and by injunction. Imagination is active in the child, but logic and judgment are the products of time.

Hygiene of Childhood. The normal body heat of 98.6° must be maintained in young or old in all seasons and climates. The metabolism necessary therefor is dependent upon the amount of muscular activity and the proportion of body surface, both great in the young child. The infant gives off a very large amount of carbonic-acid gas and therefore needs a relatively large amount of fresh air. The skin contains 28 miles of ducts, carrying off effete matter in the perspiration; hence the need of clean skin properly protected. Infants require a daily bath, and older children two or three baths each week. Proper protection means woolen clothing next the skin in cold weather and at all times except when there is great heat. Children, on account of their activity; do not need heavy clothing, but should have warm wraps to wear when at rest. They should never remain in damp clothing or shoes, but change to dry as soon as they cease being active. The circulation is feeble during sleep; hence the need of warm night clothing. The temperature of the sleeping room should be 50°–60° and the windows open according to season. It should be remembered that one gas jet consumes as much oxygen as five persons, therefore excess of lighting should be avoided.

Sleep. The heart rests one-quarter of the time between beats, but the brain can rest only during sleep. A child under four years of age requires a nap in midday; a child of six or eight years, 12 hours of sleep; at 10 years, 11 hours; at 12 to 14 years, 10 hours. A child restless in sleep probably has trouble with his digestion. "Do not blame Providence for parental improvidence." The child should have sim-

ple food and proper action of the bowels daily. Physiological habits must be commenced in early life.

Diet. Children require food both for fuel and for growth, whereas the adult needs are for heat and repair only. The feeding of infants is such an important matter that it will be dealt with as a special topic. (See INFANT FEEDING.) A few simple principles are sufficient for the purposes of this article. After weaning, young children should have an abundance of milk both as food and drink; a variety of cereals; stale breads of all kinds, never hot; baked potatoes; stewed fruits; milk products such as junket, custard, rice pudding, etc. Though meats are not allowed, clear soups are permitted, and a little later chicken is added. Sweets are to be avoided except with meals, and even then if there be feeble digestion. Milk and eggs should be the source of proteids for the very young. They need not be stinted as to vegetables and ripe fruits. When 9 or 10 years old, they may have meat once or twice a day. Healthy children at 12 or 13 years require about as much food as an adult and of as great variety, plain food of course being understood. Neither tea nor coffee is nourishing, and although commonly used should be dropped from the dietary. Milk and cocoa or water are the proper drinks, and if children were taught to chew their food more thoroughly, they would not want so much fluid. Articles difficult of digestion should be avoided, e.g., rich pastries and puddings, hot breads, unripe fruit; among meats, pork, tongue, corned beef, and salted fish; also nuts or cheese in excess. The amount of food required will depend largely upon the weight of the child; e.g., a child of 3 years, weighing 30 pounds, will need 980 calories per day; a 5-year-old, weighing 40 pounds, will need 1200 calories, and a 15-year-old, weighing 100 pounds, will require 2000. The chemistry of food and the fuel value of ordinary diets will be found under FOOD (q.v.).

Exercise. Children play with little urging, but not always in active games. An active body means an active circulation, which in turn leads to an active mind. Young boys and girls should play the same games together, especially out of doors. At the time of puberty there are anatomical and physiological reasons for the girl desisting from some of the more strenuous sports. A list of active games for young children would include hoop rolling, skipping rope, bean bags, handball, tether ball, roller and ice skating, and, for indoors, calisthenics. Older children will play baseball, tennis, hockey, "shinny," leapfrog, tag, etc., and will also row and swim. It should be stated, as a principle, that adults may wisely suggest games, but that they are to be carried through with a minimum of outside interference.

Play is work to children and an important factor in their development. They are keenly interested in company drills, military, Swedish, or any of those common in school and gymnasium. Gorst especially advocates jiu-jitsu, which in Japan is practiced by men and women without apparatus other than their partners. Rankin wisely remarks that "some children break down from overstudy, but more from underhygiene." See PARENT AND CHILD; CHILD STUDY; CHILD PSYCHOLOGY; CHILD LABOR.

Bibliography. There has grown up a very extensive literature upon "the child" viewed from many sides. The following titles indicate works each of special value in its own field. Preyer, *The Mind of the Child* (1881); Hall, *Adolescence* (1904); Chamberlain, *The Child* (1900), with very extensive bibliography; King, *Psychology of Child Development* (1906), also extensive references; Rankin, *Hygiene of Childhood* (1890); Oppenheim, *The Development of the Child* (1898); Rowe, *Physical Nature of the Child* (1899); Gorst, *The Children of the Nation* (1907); Pfaundler and Schlossman, *Diseases of Children* (1912), for metabolism, foods, etc.

CHILD, FRANCIS JAMES (1825–96). A distinguished American scholar and teacher. He was born in Boston, was educated there in the public schools, and graduated from Harvard College in 1846. He immediately entered into the service of the college, becoming in 1851 Boylston professor of rhetoric and oratory, and in 1876 professor of English, which post he held until his death, Sept. 11, 1896. His zeal for learning and genuine love of literature, supplemented by a thorough knowledge of the best in foreign scholarship, enabled him not only to make his courses at Harvard very valuable, but also to enrich American scholarship with a series of excellent editions and studies. His contributions are an edition of *Four Old Plays* (1848); the *Poetical Works of Edmund Spenser* (5 vols., 1855), which remains the best edition of the poet and which was his special contribution to the American edition of the British poets, of which he was general editor; *Observations on the Language of Chaucer* (1862); *Poems of Sorrow and Comfort* (1865); *Observations on the Language of Gower's Confessio Amantis* (1866); and his greatest work, the definitive and monumental edition of the *English and Scottish Ballads*. This was first issued in 8 small vols. (Boston, 1857–58) and, after a most painstaking research and revision, appeared in 10 large vols. (Boston, 1882–98). For biographical sketches of Professor Child, consult Norton, in vol. vi of the *Harvard Graduates' Magazine* (Boston, 1899), and Kittredge, in the revised edition of the *English and Scottish Ballads* (1904).

CHILD, SIR JOSIAH (1630–99). An eminent London merchant and one of the popular English writers on commerce and political economy. He was the second son of Richard Child, a merchant of London. His principal work is entitled *Brief Observations Concerning Trade and the Interest of Money* (1668); a second edition, much enlarged, entitled *A New Discourse of Trade*, was published in 1694. In this work Child takes the position of a moderate mercantilist, accepting the balance of trade doctrine, but urging the advantage of a relaxation of the restrictions upon trade. The work was translated into French by Gournay in 1754 and exerted an important influence upon the development of liberal doctrines. The work is also of significance as a contribution to the literature of pauperism. Child was one of the directors, and for some time governor, of the East India Company, and a tract entitled *A Treatise wherein it is demonstrated that the East India Trade is the most National of all Foreign Trades* (1681) is attributed to him. In 1678 he was created a baronet. He died June 22, 1699.

CHILD, LYDIA MARIA FRANCIS (1802–80). An American author, born in Medford, Mass. Inspired by an article in the *North American Review*, she wrote a novel dealing with early New England life entitled *Hobomok* (1821).

Her next story, *The Rebels* (1822), dealt with Boston before the Revolution. In 1829 she wrote *The First Settlers of New England*, and in 1836 a biography of Madame de Staël. After a short experience at school-teaching, she married, in 1828, David Lee Child, a journalist, and a little later, coming under Garrison's influence, both she and her husband found their real life work. In 1833 she published what is regarded as the first antislavery book by an American, *Appeal for that Class of Americans Called African*. She was, of course, more or less ostracized, but made converts. In 1840 she began to edit the *National Anti-Slavery Standard* in New York. In 1844, with her husband, she settled in Wayland, Mass., and continued her work of propaganda, having meanwhile published many volumes of a miscellaneous nature, including her best performance, *Philothea* (1836), a tale of the time of Pericles. In 1853 she issued *Isaac T. Hopper: A True Life* (reprint, New York, 1881), having learned to know that philanthropist during her stay in New York. She should also be remembered as a writer for children. Her literary work has not continued popular, being often overambitious, as in the case of her *Progress of Religious Ideas through Successive Ages* (3 vols., 1855); but her personality was a fine one and is well depicted in Higginson, *Contemporaries* (Boston, 1899). Consult her *Letters* (Boston, 1882).

CHILDBIRTH. See OBSTETRICS.

CHILDEBERT. See FRANKS.

CHILDE (chīld) **HAR'OLD'S PILGRIMAGE.** A narrative poem, by Lord Byron, in four cantos, the first two of which appeared in March, 1812, in quarto, and the last two in 1816 and 1818, severally. The publisher, Murray, gave £600 for the first two cantos and 2000 guineas for the fourth. The piece abounds in descriptive passages and is conceived in an eminently "Wertheresque" spirit, detailing the impressions of a romantic youth during his *Wanderjahre*.

CHILDERMAS, chīl'dĕr-màs (AS. *cilda mæsse*, or *cildra mæsse*, children's mass), or HOLY INNOCENTS' DAY. A day (December 28; in the East, December 29) observed by the Roman, Greek, Anglican, and other churches in remembrance of the children killed by Herod. The learned Gregory says: "It has been a custom—and yet is elsewhere—to whip up the children upon Innocents' Day morning, that the memory of Herod's murder might stick the closer." It is also a holiday in the Church of England.

CHILDERS, chīl'dĕrz, HUGH CULLING EARDLEY (1827–96). An English statesman, born in London. He graduated at Cambridge in 1850 and then went to Australia, where he was commissioner of trade and customs for Victoria until 1857. He then returned to England and entered Parliament. He was First Lord of the Admiralty in Gladstone's first ministry, from 1868 to 1871, and introduced several important reforms in the navy. In the second Gladstone ministry he was Secretary of War from 1880 to 1882, during which time the Egyptian War and the Boer War occurred. He then became Chancellor of the Exchequer and during his term of office effected a reduction in rates for telegrams. In the Gladstone ministry of 1886 he was Home Secretary. He wrote in behalf of free trade and national education and was a fellow of the Royal Society.

CHILDERS. ROBERT CÆSAR (1838–76). An English Oriental scholar. He was educated at Wadham College, Oxford, where he was Hebrew scholar. In 1860 he was appointed a writer in the Ceylon Civil Service and acted as private secretary to the Governor, Sir Charles McCarthy. The state of his health forced him to return to England in 1864, and in 1872 he became sublibrarian at the India Office, London. From 1873 until his death he was the first professor of Pali and Buddhist literature at University College, London. While a resident in Ceylon, Childers had acquired a thorough knowledge of the Singhalese or Ceylonese language. In 1869 he published his first contribution to Oriental literature, in the *Journal of the Royal Asiatic Society*. This was the Pali text of the *Khuddaka Patha*, with a translation into English, and notes. It was the first Pali text ever printed in England. To the preparation of the Pali dictionary, of which he felt the imperative need, Childers devoted nearly all of his time from 1869 until his death. This work was completed in 1875, in 2 vols., and was awarded the Volney prize for 1876 by the Institute of France. After the completion of this great work he contributed many minor papers to the transactions of the learned societies, and had in contemplation a complete translation of the Buddhist Jataka Book. His unwearied exertions, however, told upon his enfeebled constitution, and he developed consumption, of which he died, July 25, 1876.

CHILD LABOR. The employment of children in industry, while dating from the earliest historical times, did not become a social problem of the first importance until the introduction of the factory system in England in the latter part of the eighteenth century, in other modern countries during the nineteenth century, especially after 1860. Under earlier conditions the employment of children, either under their own parents or as apprentices under a master bound by law and custom to safeguard their interests, was regarded as an excellent thing. Thus the habits of steady industry, so necessary under the existing system of production, were inculcated in the earliest years. The close personal relation between the master and apprentice or parent and child and the restraining influence of public sentiment were, as a rule, sufficient to prevent serious abuse; moreover, experience showed that it was difficult to drive a child beyond his powers of physical endurance.

In the last quarter of the eighteenth century the introduction in England of power machinery for spinning cotton, and later for spinning wool and for weaving, brought about a fundamental change in the conditions of child labor. The work required rather deftness than physical strength; accordingly the labor of children was in many cases more productive than that of the existing adult population, trained in agriculture or in the more leisurely methods of domestic industry. A large supply of child labor was to be had from the poorhouses, the custom having long existed of apprenticing pauper children to any person who would engage to bring them up to honorable employment. Accordingly the new cotton mills in the north and west of England collected pauper children throughout the kingdom, obtaining their services for the cost of their maintenance. Profits were naturally high at first, and competition increased. In the struggle to maintain profits the various manufacturers—especially those who operated antiquated

machinery—lengthened the hours of employment for their child workers and cut down the costs of food and housing, until at last an indescribable condition of child slavery came into existence. Children of five years were in some cases compelled to work from 13 to 16 hours a day; their food was barely sufficient to keep them alive, and no regard was had for the most primitive rules of sanitary housing. At length in 1802 an Act of Parliament limited the working day to 12 hours, forbade night work, and required elementary instruction for apprentice laborers in cotton factories. In the meantime the competition of the factories had practically destroyed domestic production of textiles, and families formerly engaged in home work were driven to migrate to the factory towns, where the low rate of wages and high cost of living compelled them to place their children in the mills. To such children the Act of 1802 did not apply; and the evils of the apprentice system were duplicated in the case of children living with their parents. In 1819, after many years of agitation, a law was enacted forbidding employment in cotton factories of all children under nine, and limiting hours for children under 16 to 12 daily. No special provision was made for the enforcement of the law, and it was frequently evaded. In 1825 an Act was passed which provided a Saturday half holiday for child workers in cotton factories, and in 1831 night work of persons under 21 was prohibited. This legislation was replaced by the Factory Act of 1833, which made provision for factory inspectors, prohibited night work for persons under 18, fixed 48 hours a week as the maximum for children between 9 and 13, and 69 hours for persons between 13 and 18. Two hours' schooling per day was required for all children. The Act applied to all textile works with the exception of silk mills. In 1842 employment of children under 10 in mines and collieries was prohibited. The Act of 1844 limited the hours of children under 13 to 6½ per day and required school attendance for the remaining half day. In 1848 the hours for children under 13 were limited to 5, and those of "young persons" (13–15) to 10. This Act may be regarded as the basis of all modern regulation of child labor. In the following three decades a number of acts were passed extending the scope of the law and improving its machinery for enforcement. In 1878 all previous legislation was consolidated into one great factory act. The minimum age of employment was raised to 10 years, and children from 10 to 14 might be employed only one-half day or on alternate days. For persons from 14 to 18 the work day was required to begin at either six or seven in the morning and to close at the same hours in the evening, with an intermission of two hours for meals and rest. All Saturdays were made half holidays, as well as eight other days in the year. Minute regulations were made relative to the fencing of dangerous machinery and to sanitary conditions. In 1902 a new and more complete code went into effect, raising the minimum age to 12 years. Many of the provisions of the law were extended to home workshops.

In the United States, while some children were employed in factories in the first half of the nineteenth century, the problem did not become serious until the great industrial expansion in the first decade after the Civil War in the Eastern and Middle Western States and in the last decade of the century in the Southern States. By 1879, in Massachusetts children from 8 to 11 were found working in factories from 11 to 14 hours daily. Even worse conditions prevailed in New York and Pennsylvania. According to the census of 1900 children under 16 formed 13.3 per cent of all persons engaged in cotton manufacture in the United States. In 1909 the percentage had declined to 10.4. For manufactures in general the percentage of children under 16 declined from 3.4 in 1899 to 2.4 in 1909. The largest percentages of child workers were in South Carolina (12.9) and North Carolina (11.3). The total number of children under 16 employed in manufactures remained practically stationary through the decade 1899–1909. In the former year the number was 161,276; in the latter, 161,493. The greatest employer of child labor in 1909 was the cotton manufacturer (40,221). Hosiery and knit goods (11,111) and canning and preserving (11,035) were next in order of importance. Over one-half of the children employed in industry were found in the Middle Atlantic States (44,464) and the South Atlantic (41,856). New England employed 33,575.

Laws relating to child labor in the United States generally fix a minimum age limit, prohibit certain kinds of employment for children, as dangerous to health or morals, limit the number of hours a person under a certain age may be employed, prohibit night work for children, and, in a large number of cases, fix educational requirements for children under a given age as a prerequisite to employment. In 26 States the age limit is 14 years; in three other States the limit is 12 years for certain industries, 14 for others. South Dakota has an age limit of 15 years and Montana of 16. In several of the Southern States the age limit is 12 years. For employment in mines, quarries, smelters, the limit is fixed at 14 years in most States. Fourteen (in certain cases 16) years is the limit in Pennsylvania, while 12 years is the rule in the South. In most States the affidavits of parents or guardians are accepted as proof of age; in New York and Massachusetts more reliable evidence is required, such as a birth or baptismal certificate or a convincing school record. Evasion is nevertheless common in most of the States, many children under age being employed.

In California and Michigan children under 18 may not be employed in factories more than 9 hours a day. Children under 16 are limited to an eight-hour day in factories in New York, Ohio, Massachusetts, and several nonindustrial States. Ten hours is the usual limit.

In a majority of the States children under a certain age, ranging from 14 to 21 years, may not be employed in places where alcoholic liquors are sold or in such occupations as that of rope walker, gymnast, contortionist. Singing or playing on a musical instrument in a public performance is also prohibited in many States. Peddling, the selling of newspapers on the street, and other street trades are prohibited for children under 14 in a majority of the States.

Almost all the States prohibit the employment of children in operations especially dangerous to life and limb. Cleaning of machinery in motion is prohibited for boys under 18 and girls under 21 in Michigan and New York; for boys under 16 and girls under 18 in Indiana and Iowa; for children under 16 in many States; for all minors in West Virginia, Missouri, and

New Jersey. The progress in the regulation of the employment of children in dangerous trades is indicated by the fact that while in 1879 only four States had enacted laws on the subject, 44 States had enacted such laws in 1910. As a rule, 16 is the age limit for dangerous occupations.

Night work is prohibited in over half the States for children under a specified age. In manufacturing establishments no children under 18 may be employed at night in California, Massachusetts, Michigan, New Hampshire, New York, and North Carolina. Laws relative to night work are in a large measure evaded in the glass industry. The conditions of the industry require continuous operation by day and night, and for each glass blower a boy must be employed as helper. Such boys are often below the age limit prescribed by law. The glass-works are as a rule located in rural districts, where fuel (natural gas) is readily obtainable, and hence escape frequent inspection.

In a large number of States the attendance at school during a specified number of weeks of the previous year is made a prerequisite to the employment of children over the minimum age limit. In about 30 States restrictions are placed upon the employment of children who cannot read and write the English language. Fifteen States prohibit the employment of illiterate children under 16.

The administration of the child-labor laws is in some States intrusted to a body of factory inspectors; in Massachusetts it is conducted by a special branch of the police. In some States, especially in the South, no machinery for enforcing the laws exists. In very few of the States is the administration of the law effectively conducted. Inspectors, when such are appointed, are usually too few in numbers to perform the work of inspection adequately. Trade-unions are often active auxiliaries of the factory inspectors in securing the enforcement of the law, and in some parts of the country voluntary associations of citizens assist in this work. In some 15 States child-labor committees have been formed to secure the enforcement of existing laws and the enactment of further child-labor legislation. The State committees are federated in a National Child Labor Committee, which holds annual meetings and carries on a propaganda throughout the country. In this way it is hoped that one of the most serious objections to child-labor legislation may be removed, viz., that stringent laws in one State tend to drive industries across the border into States where such laws are lax or are unenforced. A uniform child-labor law was adopted by the committee in 1911, which in several instances has been enacted by State legislatures.

An official movement in the same direction is represented by the creation in 1912 of a Children's Bureau under the Department of Commerce and Labor (now under the Department of Labor) to systematize inquiries into the conditions under which children, particularly child laborers, live throughout the country.

On the continent of Europe child labor in factories became a serious evil in the seventies in Germany and Belgium; in Italy, about a decade later. In practically all European countries at present children are employed in factories, but in none so extensively as in the three states mentioned. Germany as early as 1839 enacted a child-labor law after the model of the English law of 1833, but in many particulars improving upon that law. In the other countries child-labor legislation is of much more recent date. European laws fix a minimum age, limit the working day for children employed in certain occupations, and prohibit night work and employments regarded as dangerous to health or morals.

In Germany the age limit is 13, and children from 13 to 14 may be employed only 6 hours daily, children under 16 may be employed not more than 10 hours. In Belgium, for factory labor, the age limit is 12 years. In Italy, under the law of 1902, the limit of 12 years is fixed for all factory labor and for work in mines, quarries, etc.; in France the limit is 13, and children from 13 to 16 may not labor more than 10 hours daily. Twelve is the age limit in Austria, Hungary, Denmark, Sweden, Holland, Portugal, and Russia; 10 is the limit in Spain, and 14 in Switzerland and Norway. Night work for girls under age is prohibited in Austria, Belgium, France, Germany, Italy, Portugal, Russia, and Switzerland; for girls under 18 in Denmark, Norway, and Sweden; for girls under 17 in Spain; under 16 in Hungary. Night work for boys under 18 is prohibited in France, Norway, and Switzerland; for boys under 16 in Austria, Belgium, Germany, Holland, Sweden, and Hungary; under 15 in Italy, Russia, and Spain; under 14 in Denmark, and under 12 in Portugal.

The enforcement of the child-labor laws is in most European countries very strict. The enactment of child-labor laws has in every country encountered determined opposition from manufacturers engaged in occupations where child labor is profitable; from certain property owners, who fear that prohibition of employment of children will augment the burden of pauperism, and from a class of political theorists who regard all classes of state interference in industry as objectionable. Experience has shown, however, that the abolition of labor of small children does not seriously handicap any branch of manufacture, automatic machinery being usually introduced when reliance is no longer placed upon cheap labor. Nor does it appear that the burden of pauperism is actually increased, the wages of the adult members of a family usually increasing with the disappearance of child labor. Recent investigations in Great Britain have brought to light striking evidence of the physical and mental degeneracy of the population in districts where children have been largely employed; accordingly there appear to be strong grounds for the view that child labor is uneconomical from a social point of view as well as morally indefensible.

Consult: Gibbins, *Industrial History of England* (2d ed., New York, 1898); Warner, *Landmarks in English Industrial History* (New York); Cheyney, *Industrial and Social History of England* (New York, 1901); Oliver, *Dangerous Trades* (New York, 1902); Murphy, *Problems of the Present South* (New York, 1904); Hunter, *Poverty* (New York, 1904); Adams and Sumner, *Labor Problems* (New York, 1905); Kelley, *Our Toiling Children* (Chicago, 1889); id., *Some Ethical Gains through Legislation* (New York, 1905); Spargo, *Bitter Cry of the Children* (New York, 1906); Thompson, *From Cotton Field to Cotton Mill* (New York, 1906); *Bulletin of the Bureau of Labor*, No. 52 (Washington, 1904); Noseda, *Il Lavoro delle*

donne e dei fanciulli (Milan, 1903); Ferraris, "Das neue italienische Gesetz betr. die Frauen- und Kinderarbeit," *Archiv für soziale Gesetzgebung und Statistik* (Berlin, 1903); Bauer, "Die neure Kinderschutzgesetzgebung in Deutschland und in Grossbritannien" (ib., 1904); Clark, "Woman and Child Wage Earners of Great Britain," *Bulletin of the Bureau of Labor*, No. 80 (Washington, 1909); Veditz, "Child Labor Legislation in Europe," *Bulletin of the Bureau of Labor*, No. 89 (Washington, 1910); Bureau of Labor, *Report on the Condition of Woman and Child Wage Earners in the United States* (19 vols., Washington, 1909–13); Ogburn, *Progress and Uniformity in Child Labor Legislation* (New York, 1912). See LABOR LEGISLATION; FACTORY LAWS.

CHILD OF NATURE, THE. A play by Mrs. Inchbald. It was produced at Covent Garden, Nov. 28, 1788, and published in London. It is taken from Madame de Genlis.

CHILD OF THE SEA. A surname given to Amadis de Gaul, the mediæval hero. It originated in the story that, while still in his cradle, he was thrown into the ocean by his mother to conceal her dishonor.

CHILD PSYCHOLOGY. The study of the mind of the child forms one department of general psychology. The existence of such a department implies that the mental processes of the child are, in a certain measure, different from our own or, perhaps, that they demand a special method of investigation. In some cases the child has been subjected to experiment and asked to give a verbal report, though it must be admitted that these cases are few in number. The methods employed in the experiments of Darwin and Preyer are precisely the same as the methods of animal psychology (q.v.), except that they were not so well controlled; the behavior of the infant was taken in lieu of a verbal report and was interpreted as accurately as might be. The behavior report is, however, much less precise than verbal report, and the interpretation also must therefore be less precise. Moreover, neither kind of report is of scientific value unless the experiment has been controlled, unless every known source of error has been eliminated and the experiment varied and repeated. Unfortunately these conditions have not been met in a large proportion of the work in child psychology. An evaluation of the results cannot be made, therefore, until the methods have been examined.

One of the methods used extensively in child psychology is known as the questionary method. The procedure is to prepare a list of questions and to send it to parents, interested friends, teachers, students, etc., with the request that they record the behavior report of the child. In cases of this kind it is evident that the person who records the report is, ipso facto, an experimenter, whose business it is to note the conditions, to eliminate the errors, and to interpret the report. As a general rule, such an experimenter is untrained in scientific method, is unable to distinguish between fact and fancy, and he may have a personal affection for the child and a desire to show its superior intelligence. The results are, then, on a par with those obtained by the anecdotal method of animal psychology. The person who originally submitted the lists, and who also has the task of interpreting the many replies, is a second experimenter, who has at hand a large amount of material obtained under conditions of which he knows practically nothing; who finds that many of his questions have not been answered specifically, while some replies defy interpretation; who is forced to sift, to pick and choose, and, finally, to bring his material under some imposed system of classification; so that the accuracy of the final product is doubtful in the extreme. However, it should in justice be said that many psychologists have never used the method, and that of recent years it has tended, save in a few exceptionally favorable cases, to fall into disuse.

Another method which has been frequently employed, and which may be designated the "diary method," has proved to be of greater value, especially when employed by skilled observers. By its use we have obtained a great deal of knowledge of the sensory and motor development of the infant, of the beginnings of its perceptual and emotional life, and of its early attempts at the construction of a language.

The psychology of the child of school age has been investigated, for the most part, by means of methods devised for the purposes of experimental pedagogy. These methods usually take the form of tests, and they are designed to discover the "ability" of the child to discriminate between stimuli, to concentrate the attention, to memorize such and such material, etc. (See MENTAL TESTS.)

It appears, from this brief review of its methods, that child psychology, as it exists, is not a structural or qualitative psychology, but is rather a functional or statistical psychology. The fault, if it be a fault, is not due to method per se; for, with additional refinements, a qualitative study of the child mind would be possible. The results obtained, however, are of the kind needed by experimental pedagogy, in the interest of which much of the investigation has been done. Moreover, the results do not show us a typical child mind, as experimental psychology has given us a typical adult mind; but there are several child psychologies, each typical in the sense that it discusses the same set of faculties or capabilities at different levels. Since, now, these capabilities are functions of the nervous system, and since the nervous system shows well-marked periods of growth and development, child psychology is necessarily written from the genetic point of view, and the stages of mental development are naturally brought into correspondence with periods of physical growth. (See CHILD STUDY.) We have, then, three periods: infancy, from birth to school age; childhood, from school age to puberty; and adolescence, from puberty to about the twenty-fifth year. However, from the psychological point of view as opposed to the physiological, the first six years in the life of the individual comprise two epochs, that which precedes and that which covers the acquisition of language; the period of infancy, therefore, might well be subdivided.

The most general result of the investigations of the child mind is that the sensitivity and the power of discrimination of the child, in all sense departments, are less than in the adult; and they are the less developed, the younger the child. However, with the possible exception of sound, the newly born infant experiences intensive stimuli of all kinds.

By the end of the first six months the child has learned to perceive and localize objects within its reach, has recognized persons, and

has experienced the emotion of fear. By the close of the first year the child has perceived objects at a distance, has experienced the emotion of anger, has learned to walk, and has thereby increased his notions of space. He is also learning to speak, a fact which probably marks the beginnings of conscious meaning. From this time until the school age of the child the most important acquisitions are those of the images of memory and imagination. These images are apparently more vivid than in adult experience, and it is with great difficulty that memories and fancies are distinguished from each other and from sensory experience. Sensory discrimination and sensibility develop slowly. The ability to name colors is poorly developed even by the seventh year, though white and black are well known; of the colors, red and orange are best known, then follow purple, violet, and blue, then green, and finally yellow; pitch discrimination and memory for melodies show wide individual variation. Spatial perceptions develop much earlier than temporal; infants from 14 to 16 months are often able to follow a rhythmical movement, but boys of six and seven years have shown great difficulty in marking a rhythm with the proper time intervals; children also have much difficulty in forming temporal ideas of long periods of time, like weeks or months, though the shorter periods of the day give less trouble. The most important characteristic of the adolescent period is the appearance of new emotions, many of which are doubtless the correlate of the development of the sexual life; but the intellectual, ethical, æsthetic, and religious sentiments also, as a rule, become manifest for the first time.

Consult: Preyer, *The Mind of the Child* (New York, 1888–89); Shinn, *Notes on the Development of the Child* (New York, 1893); Tracy, *The Psychology of Childhood* (Boston, 1910); Claparède, *Psychologie de l'enfant* (Genève, 1909); Meumann, *Vorlesungen zur Einführung in die experimentelle Padagogik* (Leipzig, 1907); Hall, *Adolescence* (New York, 1905).

CHILDREN, Diseases of. Diseases of children have occurred as far back in history as have diseases of adults, but in recent years their study has become a recognized specialty under the title "Pediatrics" (child cure).

Monographs on the subject began to appear in the fifteenth century, usually in Latin. The English translation of Harris's *De Morbis Acutis Infantum* appeared in 1734; the original appeared in 1715. French and German books followed at intervals, and by 1850 Meissner of Leipzig completed his *Grundlage der Litteratur der Pädiatrik* containing 7000 titles.

Among the larger works should be mentioned Keating's *Cyclopædia of the Diseases of Children*, 1889, and *The Diseases of Children* by Pfaundler and Schlossman, 1908. Americans seem to give more attention to the diseases of children than do other nations, and the specialty is well recognized here. A few authors have subdivided the specialty and now treat of the surgery of children. A generation ago medical students heard the subject alluded to or attended an occasional clinic by the midwifery professor, who might show a sick child. Now every well-regulated college has a chair of pediatrics with regular lectures and clinics.

Since 1880 there has been a children's section in the leading medical associations, both here and abroad. The American Pediatric Society was founded in 1889. In 1913 New York City contained 121 hospitals, 12 of which were specifically for children, and most of the general hospitals had a children's ward. These statements indicate the importance of the subject. Children are not merely small adults. They differ in anatomy, in much of their physiology, and in their reaction to drugs. (See Child, Development and Growth of.) The children's physician has a field quite his own, with distinct pathology, symptomatology, and therapeutics.

Children give off heat rapidly and therefore bear cold badly. They are, consequently, frequent sufferers from catarrh of the nose, throat, lungs, and intestinal tract. The tonsils are frequently enlarged in the young, and with that condition may occur adenoids (q.v.). Bronchitis is very common and causes 45 per cent of the deaths under five years. Pneumonia is of the catarrhal form in children, rather than croupous, as in adults. Diarrhœa and enteritis are catarrhal troubles and cause seven times as many deaths under two years as after that age. In 1910, in the registration area of the United States, 28.9 per cent of infant deaths were diarrhœal. Intussusception of the intestine is an infantile ill and often fatal. Most intestinal diseases of childhood and infancy are unlike those of adults in that they are more severe and likely to be fatal.

Fevers are well borne by the young, even typhoid, which they not infrequently contract from infected milk. Diphtheria and the eruptive fevers, as measles, scarlet fever, German measles, chicken pox (q.v.), are counted as children's diseases, though adults may have them if they have not acquired immunity by attacks in youth. Croup is diphtheritic membrane in the larynx. It calls for antitoxin as much as if it were a visible exudate in the throat.

The nervous system is undeveloped in the young; hence the readiness with which they have fits or convulsions, not as the initial symptom of acute illness, but at any time. Poliomyelitis, or infantile paralysis (q.v.), and chorea (q.v.), or St. Vitus's dance, are seen in the young almost exclusively. Hydrocephalus, acute or chronic, begins in early life. According to Gowers, 12 per cent of the cases of epilepsy begin before three years of age. In the intestinal tract we find parasites: *Ascaris lumbricoides*, or round worms, and *Oxyuris vermicularis*, or threadworms. The child host of a tapeworm generally entertains *medio-canellata*, while the adult harbors *Tinea solium*. (See Worms.)

Acute articular rheumatism is not so common in children as in adults; nevertheless they often have valvular lesions of the heart. Tuberculosis occurs in the lungs of children, to be sure, but its favorite seat of attack in the young is the bones or glands. Orthopædic hospitals are mostly filled with children, and the majority of them suffer from spinal, hip, or other joint diseases that are probably tuberculous. Any doubt as to diagnosis is cleared up by the Von Pirquet test, a cutaneous inoculation with tuberculin (q.v.). Enlarged glands were called strumous by the older writers, but are now regarded as tuberculous. (See Scrofula.)

There are several rare affections of the newborn known by the names of the first describers —*Buhl's disease*, an acute fatty degeneration of the tissues with ecchymosis and extravasations of blood everywhere. The symptoms are very like phosphorous poisoning. It is caused by an

infection of unknown origin and leads to death in a week. *Winckel's disease* is similar, being a disorder showing a tendency to punctiform hemorrhages, jaundice, cyanosis, and hæmoglobinuria. It is at times endemic and usually ends in death. *Barlow's disease* is infantile scurvy, and is found in older infants, especially those fed upon improper artificial foods. It is characterized by hemorrhages in the gums and under the periosteum of the long bones, thereby causing pain on motion or on being handled. *Duke's disease*, also called "Fourth disease," is in its *eruption* like scarlet fever, though the temperature does not rise so high nor are there likely to be serious sequelæ.

The following diseases are common in infancy and childhood, but show deviations from the adult form when occurring. *Jaundice* or *Icterus neonatorum:* This appears on the second or third day after birth and continues for a week or two in varying degrees of intensity. It is due in some cases to sepsis rather than to obstruction of the bile ducts, as in later life. No treatment is required, though saline laxatives are sometimes given. *Diseases of the navel:* If the navel fails to heal properly, it may be dusted with boric acid. Should it tend to form a hernia, it should be reduced by placing a coin firmly upon it and fastening it with adhesive plaster. *Congenital debility:* This is not always from prematurity nor from syphilis. Warmth and proper nourishment will effect a cure. The first is had by putting the baby in an incubator; the second will tax the ability of the physician to the utmost. *Scleroderma:* A serous or adipose hardening of the skin, chiefly of the lower extremities, but extending all over the body. It begins soon after birth, and if slight will recover under the use of warmth. The cause is not known. *Diseases of the blood:* As compared with the adult, the infant blood contains less hæmoglobin and an excess of leucocytes, or white cells. Many illnesses result in anæmia, and many conditions lead thereto, e.g., poorly ventilated schoolrooms. The remedy is plenty of fresh air, or the out-of-doors school in some cases. To these add iron, arsenic, and other tonics, with a liberal diet, preferably vegetable. *Leukæmia:* A disease with excessive increase of white blood cells and an increase in size of the lymphatic vessels and glands. It is possibly due to parasites. The spleen becomes very large. Treatment is unsatisfactory, death occurring in a few weeks or months. Cause unknown. The blood shows diminished hæmoglobin and in general the picture of anæmia with nucleated red cells. The mortality of hæmophilias is 87 per cent (Von Etlinger). *Heart disease* is likely to show in the pulmonary or mitral valves in the young, whereas the aortic valves are affected in later life. The *tumors* of childhood are most often sarcomata, rather than cancer as in adults.

The therapeutics of childhood differs from that of the adult in more than the size of dose administered. The young do not bear cold baths well, nor bleeding, nor shock. Burns and blisters are exceedingly severe on the tender skin of the child. Opiates must be given with care, if at all, and not often repeated. Preparations of arsenic, belladonna, iron, and mercury, on the other hand, are well borne in comparatively large doses. Mercury, if given in too large quantity, does not salivate the child, but causes intestinal irritation. The child tolerates heart stimulants in large doses, but not so depressants. The metabolism of childhood is active, and the prognosis is better than in adult life, because of the strong tendency to growth and repair instead of degeneration.

Consult: Holt, *Diseases of Infancy and Childhood* (1911); Sachs, *Nervous Diseases of Children* (1905); Pfaundler and Schlossman, *Diseases of Children*, Eng. trans. by Shaw and La Fetra (1912); Grulee, *Infant Feeding* (1912); Batten and Thursfield, *Diseases of Children* (London, 1913).

CHILDREN, Societies for. In modern charitable work great emphasis is laid upon work for the children, as they stand in the greatest need of protection and assistance and can be most easily influenced for the better. The children's aid societies and foundling hospitals care for the dependent children and find homes for them, while the Humane Association and Society for the Prevention of Cruelty to Children shield them from abuse. Juvenile offenders are trained in industrial schools and reformatories. There are homes for crippled children, special hospitals for the sick, crèches for those whose mothers must work, schools for the deaf and dumb, the blind, and feeble-minded. Boys' and girls' clubs are found in all cities. Home libraries bring books within easy reach. In some States boards of children's guardians become responsible for those left destitute. See Dependent Children; Penology.

CHILDREN IN THE WOOD, The. A British ballad, better known under the title of "The Babes in the Wood." According to Ritson, it "appears to have been written in 1595, being entered that year on the Stationers' Books." Bishop Percy considers the subject to have been derived from an old play by Robert Yarrington (1601), which tells of "a young child, murthered in a wood by two ruffins with the consent of his unkle." As the scene of the latter piece, however, is laid in Padua, not in Norfolk, Percy's reasons for a later date are by no means conclusive. As a matter of fact, nothing is definitely known of the authorship or date of the poem. A black-letter copy, very old, was contained in Pepys's collection and bore the title *The Children in the Wood, or the Norfolk Gentleman's Last Will and Testament; to the tune of Roger.*

CHILDREN'S AID SOCIETY. An association for rescuing neglected, wayward, and dependent children. The first was started in New York City in 1853 by Charles L. Brace. Its objects are to rescue neglected and dependent children, train them, and find situations and homes, chiefly in country districts. These and similar societies, under various names, are found in all cities and have done a valuable work. See Dependent Children.

CHILDREN'S BUREAU. A bureau established under the Department of Commerce and Labor (in 1913 placed under the Department of Labor) by law of April 9, 1912. Under the law the bureau is authorized to investigate, and report to the Department of Labor, all matters pertaining to child welfare and child life. Such matters as the birth rate, infant mortality, juvenile courts, accidents and diseases of children, child labor, labor laws of the various States affecting children, are specified in the law as falling within the province of the bureau. The bureau is under the direction of a chief appointed by the President with the advice and

consent of the Senate. The first chief of the bureau was Miss Julia C. Lathrop.

CHILDREN'S COURTS. See JUVENILE COURTS.

CHILDREN'S CRUSADE. A movement in 1212, in which thousands of boys and girls with some older persons set out to recover Jerusalem. Many French children wandered about in processions for a time, but soon were compelled to return home. The German children, who are said to have numbered 20,000, marched up the Rhine valley, across the Alps, and down to Genoa. They believed the Mediterranean would open and leave a passage, as the Red Sea had done for the children of Israel. Some went on to Rome and Brindisi; some were induced to embark and sold into slavery; some remained in Italy; the remnant returned home after some months of wandering. The movement excited great interest among contemporaries and gave rise to many false stories. Modern accounts, such as Gray's *Children's Crusade*, have generally followed the fabulous tales and are untrustworthy. See *American Historical Review*, April, 1914, for the true story.

CHILDRESS. A town and the county seat of Childress Co., Tex., 200 miles (direct) northwest of Fort Worth, on the Fort Worth and Denver City Railroad (Map: Texas, B 2). The railway shops are located here and comprise the town's chief industry. The water works are the property of the municipality. Pop., 1900, 697; 1910, 3818.

CHILDS, GEORGE WILLIAM (1829–94). An American publisher and philanthropist. He was born in Baltimore, entered the navy in 1842, and spent 15 months in the service. He then became a clerk in a bookstore in Philadelphia, but established an independent business in 1847, and in 1849 became a partner in the publishing house of Childs and Peterson. In 1864 he purchased the Philadelphia *Public Ledger*, one of the earliest cheap newspapers of the country, which under him attained a wide circulation and influence. His public gifts were munificent, including a memorial window in Westminster Abbey to Cowper and George Herbert; one in St. Margaret's, Westminster, to Milton; a reredos in St. Thomas's, Winchester, commemorating Bishops Ken and Andrews; a monument at Kensal Green to Leigh Hunt; a memorial fountain at Stratford-on-Avon; and in the United States, the presentation to the Typographical Society of Philadelphia of the printers' cemetery, Woodlands, in that city; the erection of monuments over the graves of Edgar A. Poe and Richard A. Proctor; the erection of a stone cross on the site of the first Christian service on the California coast, at Point Reyes; and a subscription that made possible the erection and endowment of the Home for Union Printers at Colorado Springs. His benefactions to private persons also were large. Childless himself, he educated as many as 800 boys and girls. He constantly had a number of aged literary workers on his private pension list and made many gifts and loans to struggling authors. He frequently bought up an entire edition of some book of an author whom he wished to aid. In 1885 he published *Recollections of General Grant* and in 1890 a volume of *Personal Recollections*.

CHILDS, THOMAS SPENCER (1825–). An American clergyman, born at Springfield, Mass. He was educated at New York University and Princeton Theological Seminary. Having been ordained to the Presbyterian ministry, he held pastorates at Hartford, Conn. (1851–66), Norwalk, Conn. (1866–70), and Washington, D. C. (1882–90); from 1871 to 1879 he was professor of biblical and ecclesiastical history at Hartford Theological Seminary, and from 1880 to 1882 professor of mental and moral science at the University of Wooster. He joined the Protestant Episcopal ministry in 1890 and was first archdeacon of Washington from 1894 until 1901, when he became rector of the church of Chevy Chase. His writings include: *Justification* (1861); *Hints to Christians* (1862); *The Heritage of Peace* (1868); *Christ His Own Witness* (1880); *The Voice of God to the Nation* (1901); *Christian Unity and Church Unity* (1902); *Mormonism and the Labor Question* (1904).

CHILD STUDY. A term which has been used to include the studies of the physical, psychological, and educational development of the child from birth to adulthood. At the present time many of the topics which were formerly included under child study either have an independent existence of their own or have been absorbed into experimental pedagogy. The study of the child seems to have had its origin in the pedagogical revival with which the names of Rousseau and Basedow are associated, although the first systematic study is credited to Tiedemann (1787). It was nearly a century later, however, that the best known of the earlier writers upon child study, Darwin in England and Preyer in Germany, published personal observations of infants, and Stanley Hall in America began a child-study movement which soon extended to other countries and which aroused widespread enthusiasm for the popular and scientific study of the child. While much of the earlier investigation had little scientific value, the interest in child study has grown until at the present time there are no less than 23 periodicals published in five languages devoted entirely to the child. Furthermore, we have at least the beginnings of a child psychology and a human genetic psychology, and we possess a fairly accurate knowledge of the anatomical and physiological development of the child. In recent years child study has concerned itself more and more with such problems as child labor, delinquency, defectives, abnormalities among children, juvenile courts, school hygiene, etc.; and these in turn have given rise to the child-welfare movement, which seeks to conserve and protect the child by improving the educational, hygienic, and social conditions under which he must live.

Since the mental development of the child is treated under child psychology and genetic psychology, and the educational studies are discussed under experimental pedagogy, there remain for discussion here the methods and results of the investigations of the child's physical development.

Methods. The methods which have been employed are (1) careful observations of individual children, principally as regards inherited and acquired reflexes and muscular coördinations, gross changes in the size and appearance of the body, changes in the voice, etc.; (2) the various methods of physiology which are employed in the study of the development of the organs of the body and of their functions, of changes in the composition and circulation of the blood, in respiration, voice, and speech, activities of the skin, digestion and assimilation of food, bone and muscle, and of the development of the

nervous system and sense organs; and finally (3) the anthropometric methods by means of which the size and weight of the body, shape of the head, etc., at different stages of growth are accurately measured. See ANTHROPOMETRY.

General Results. The most general result of these investigations is that the child is not, as is frequently supposed, an adult in miniature; on the contrary, the relative size and function of the bones, muscles, vital organs, and nervous system of the child are vastly different from those of the mature individual. For example, in the child the bones, at least in many parts of the skeleton, are not completely formed; they are more pliable and not so easily broken; the legs are relatively shorter, the trunk longer, and the head larger; the pulse rate is more rapid, the work demanded of the heart is greater, and the blood pressure is less; the capacity of the lungs is smaller and the frequency of respiration is greater; the total length of the digestive canal is relatively longer; bodily movements are quicker, but more irregular; and finally, the child has about one-third of the height and one-nineteenth of the weight of the adult. The development of the child is therefore not uniform in all its parts, and the rate of growth is not constant.

Periods of Development. By computing the average of a large number of measurements which show the development of each part and function of the body for each year of age, physiological norms have been made out (physiological age). However, any one individual may show a considerable variation from the norm, and for the following reasons: the nationality, the physical environment, and the health of the child, the social position, the occupation, and the material circumstances of the parent are factors which must be taken into account. Moreover, since the parts of the body may fail to develop in accordance with the requirements of the norm, a child whose chronological age is seven years may have the height of the eighth year, the weight of the sixth year, and the vital capacity of the seventh year of physiological age. But in spite of these individual variations, and because the normal organism grows now in one part and now in another, it is possible to distinguish periods or stages of growth. While there is some disagreement as to the boundaries of these periods, we may regard the first six years as the period of infancy, from 6 to 12 or 14 years as the period of childhood, and from the close of childhood until about the twenty-fifth year as the period of adolescence.

Infancy. The period of infancy is marked by a rapid growth in height and weight of the body, by an increase in the weight and size of the brain, and by the large number of muscular coördinations which are effected. The brain has increased in weight more than threefold by the sixth year of age, and it has then reached almost its normal size. The child has also acquired its permanent teeth and the difficult coördinations of locomotion and speech.

Childhood. Growth in this stage is much slower and more uniform than in the former period. There is, however, a prepubertal increase in the rate of growth, near the close of the period, which begins earlier for girls than for boys, so that at this time the girls are heavier than boys of the same age. The strength of the heart is not in proportion to the size and activity of the body in the earlier years of this stage, so that the child is easily subject to fatigue.

Adolescence. In both sexes there is at first a very rapid increase in the rate of growth in all parts of the body. At the age of 18 girls have reached the normal height of adulthood, while boys continue to increase in height until the twentieth or twenty-first year; both sexes, however, may continue to increase in weight until middle life. The period of adolescence is also characterized by the development of the sexual organs, changes in the voice, lessened motor control, increase in strength of muscle and in vital capacity, and a decrease in the frequency of heart rate. See CHILD, DEVELOPMENT AND GROWTH OF; CHILD PSYCHOLOGY.

Consult: Preyer, *The Mind of the Child* (New York, 1888–89); Dearborn, *Moto-Sensory Development* (Baltimore, 1910); Meumann, *Vorlesungen z. Einführung in die experimentelle Pädagogik* (Leipzig, 1907); Stanley Hall, *Adolescence* (New York, 1905); Whipple, *Manual of Mental Tests* (Baltimore, 1910); Claparède, *Psychologie de l'enfant* (Geneva, 1909).

CHILE, chĕ'lā, or **CHILI,** chĕ'lē (an Indian name whose origin has not been satisfactorily explained, no less than six derivations having been suggested; perhaps from the Quichua *chiri* or *chili*, cold, referring to the perpetual snow on many of the mountains). A republic in South America, occupying the west coast of the continent from the river Samu, 17° 57′ S., down to Cape Horn. In the terms of the decision of King Edward VII, signed Nov. 20, 1902, as referee in the Argentine boundary dispute, all the territory south of lat. 52° S. belongs to Chile, with the exception of the eastern half of the Tierra del Fuego Territory and Staten Island, both assigned to Argentina. Chile is bounded by Peru on the north, by Bolivia and Argentina on the east, and by the Pacific on the south and west. Thus defined, Chile has a length of about 2700 miles, while its width varies from about 250 miles in the Province of Antofagasta to about 68 miles in its narrowest part, with an average of about 87 miles. The great majority of the population is of European origin. It includes 50,000 Indians. The area and population in 1903 and 1910 are shown in the following table:

PROVINCE	Area square miles	Population 1910	Population 1903	Population per square mile 1910
Magellanes(Ter.)	66,174	23,650	13,729	0.2
Chiloé	8,580	91,657	95,914	10.4
Llanquihue	35,390	113,285	96,994	2.9
Valdivia	8,352	131,751	78,073	13.7
Cautin	5,830	161 935	71,435	23.1
Arauco	2,446	62,259	93,013	25 2
Malleco	2,973	113,020	114,978	36.8
Biobio	5,245	100,495	105,249	18 7
Concepción	3,560	225,054	220,974	66 7
Nuble	3,406	169,858	175,419	48.8
Maule	2,474	115,568	143,146	44.6
Linares	3,941	111,773	122,679	27.7
Talca	3,834	132,730	147,897	33 9
Curicó	2,978	108,120	125,102	36.0
Colchagua	3,855	159,421	186,761	41.3
O'Higgins	2,289	94,257	96,868	40.3
Santiago	5,663	546,599	483,060	91.4
Valparaiso	1,953	299,466	252,009	144.3
Aconcagua	5,485	132,730	132,670	23.9
Coquimbo	13,457	178,731	193,193	13.0
Atacama	30,720	65,118	72,901	2.1
Antofagasta	46,597	118,718	53,188	2.6
Tarapacá	18,125	115,940	101,802	6.1
Tacna	9,248	42,925	28,938	3 1
Total	292,575	3,415,060	3,205,992	11.6

Topography. The coast rises steeply from the sea throughout the greater part of its length. The region bordering it is called the "Coast Cordillera." This is not a mountain range, but a diversified table-land rising at some points to 3300 feet, but usually much lower. It is composed of granite and mica schists, skirted in some regions by Tertiary deposits which in places extend far inland. Older sedimentary rocks do not occur in the coast regions excepting a narrow strip of chalk skirting the shore. Chiloé and the smaller islands to the south have the characteristics of the Coast Cordillera and are a continuation of it.

The topography of the country behind the Coast Cordillera may be divided into four parts. The most northern, extending from the border down to the neighborhood of Copiapo, about 27° 25′ S., is a fairly even plain falling steeply towards the sea and rising to the Bolivian plateau from 12,000 to 14,000 feet above sea level. Here and there are terrace escarpments, and mountains rise in some places above the plateau; but there is no continuous range, and the numerous volcanoes, one of which, the Llullailaco, is higher than Chimborazo by about 100 feet, are completely isolated from one another. There are no east-and-west cordilleras in this part of Chile, which is crossed by the railroad from the port of Antofagasta to Bolivia with no zigzags and without a single tunnel, large cutting, or great embankment.

The second division, between 27° 25′ and 33° S., is marked by a number of transverse spurs running from the cordilleras which form the eastern boundary to the ocean and separating the river valleys from one another. These spurs, in traveling north or south, are crossed by passes which are often very steep.

In the third section the mountainous coast lands are separated from the cordilleras by a longitudinal valley which extends without interruption from the transverse ridge of Chacabuco, north of Santiago, to Puerto Montt, sloping from an elevation of 2300 feet in the north to sea level at Puerto Montt; continuing under the sea, it cuts off the island of Chiloé from the mainland. This central valley, about 600 miles in length, was originally a huge cleft that was gradually filled up by detritus washed down from the Andes and the Coast Cordillera. The drift and alluvial deposits form a layer fully 330 feet thick through which no well has yet been sunk. The soil is very rich, and as the valley is traversed and irrigated by numerous rivers from the Andes, it is the great agricultural region of Chile. In the northern part of the valley is Santiago, the capital.

In the fourth section, south of Puerto Montt, the cordilleras approach the sea, and the mainland consists of nothing but the slopes of the mountains and a strip of country lying to the east between some of the highest elevations of the cordilleras and the water parting between the two oceans. Possession of this strip was long disputed by Argentina and Chile. A treaty defined the boundary as the water parting formed by the high cordilleras. When it was ascertained that the water parting did not coincide with the line of greatest elevation, but was in large part east of it, the Chileans claimed all the country west of the water parting, while Argentina insisted that the line of greatest elevation formed the frontier. The dispute, referred to the British government, was settled by a compromise in 1902. The chain of the Andes is composed not only of volcanic products, but also of upheaved strata of the older Cretaceous and Jurassic formations. It continues straight to Cape Horn, forming a labyrinth of fiords, heading in glaciers, islands, and peninsulas. This configuration is similar to that of the Norwegian coast and of western North America, north of lat. 50°.

The chief rivers run from the Andes straight to the sea through openings in the Coast Cordillera. Their principal tributaries, however, flow from south to north in spite of the slope southward of the central valley, a singular fact first observed by Dr. Peter Möller. The river Maule, which reaches the Pacific at about lat. 35° S., is navigable from the central valley for light craft; farther south, the rivers Imperial, Biblio, Valdivia, and Bueno are navigated for some distance by small steamboats. Many rivers rise east of the cordilleras and for a space run north or south until they find an opening in the range through which they reach the ocean. A striking feature of the southern part of the central valley is the existence of several large lakes at the western foot of the Andes.

Most of the coast line is remarkably uniform, and it is only in the region of the fiords, mainly south of the forty-second parallel, that excellent natural harbors are found; but commerce here is small and the harbors are little utilized. Valparaiso, the principal port of the west coast of South America, stands on a bay exposed to heavy seas, and vessels are wrecked in the harbor every year. The ports to the north are merely roadsteads, the most important being seven little towns from Arica to Taltal, known as the "Nitrate Ports," because nitrate of soda, the leading export of the country, is shipped from them. The best shipping facilities south of Valparaiso are at Constitución, Tomé, Arauco, and Lebu (coal shipments), Valdivia, and Puerto Montt. Punta Arenas, on the Strait of Magellan, is a coaling station for all vessels passing through the strait.

Climate. The climate of Chile must be characterized as oceanic or insular, the changes of temperature being relatively slight. The northern coast lies within the region of winds which in summer blow both towards the equator and towards the interior of the continent, and is in winter almost free from storms. The southern coast lies within the region of strong westerly winds which blow at all seasons of the year. The fact that the sea air is drawn towards the land accounts for the uniform temperature. The climate of the Chilean coast much resembles that of the coast of California. In the summer the diurnal periodicity of the wind is one of the marked climatic features; on the coast the sea breeze blows during the day with great strength, and on the Andean heights with stormy violence. The average temperatures at low altitudes vary during the year from 65° F. at the north to 40° F. at the extreme south; during January they vary from 72° F. at the north to 50° F. at the south, and in July from 62° F. at the north to 32° F. at the south. The temperature decreases about 1° F. for each 300 feet of altitude. The average annual rainfall along the coast is less than 8 inches north of lat. 35° S., but from the latter parallel the amount increases very rapidly southward to over 80 inches in lat. 38° S.; and this excessive rainfall, reaching in some cases 130 inches, ex-

SOUTH AMERICA

SOUTHERN PART

SCALE OF STATUTE MILES

0 50 100 200 300 400 500 600

SCALE OF KILOMETERS

0 100 200 300 400 500 600 700 800

Important towns are shown in heavy face type

Railways shown thus

Longitude West from Greenwich

95° A 90° B 85° C 80° D 75° E 70° F 65° G 60° H 55° J 50° K 45° L 40° M 35° N 30° O 25° P 20° Q 15°

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everywhere employed on the farms; the cows are inferior as milkers, but dairy farming is on the increase. Sheep thrive in the central valley, and superior wool grades are being introduced. Goats are very numerous in the mountainous regions.

Mining. Chile is one of the chief mineral-producing countries of South America. Prior to the Peruvian War the mineral for which Chile was mainly known was copper, which still occupies an important place in the mining output of the country. With the acquisition of the Province of Tacna from Peru, the inexhaustible nitrate deposits of that region attracted the attention of foreign investors, and since then the output of that mineral has reached such enormous proportions that Chile is found to be the chief source of the world's entire supply. The nitrate deposits are worked mainly by European, and especially English, capital, and the output is almost entirely exported to Europe and the United States, where it is used for fertilizing purposes. The export of this material, which first entered the trade reports in 1884, shows the following figures in recent years, the amounts being stated in tons: 1907, 1,649,000; 1908, 2,033,000; 1909, 4,657,000; 1910, 5,078,000; 1911, 5,323,000. The copper mines are chiefly in the provinces of Coquimbo and Atacama in two ore belts about 100 miles apart. The total production of fine copper from 1844 to 1900 is estimated at 1,830,000 gross tons. Chile was in 1875 the largest copper producer in the world, but has now fallen to the sixth place after the United States, Mexico, Spain, Japan, and Australia. There is becoming apparent a revival of the industry, due to improved methods in smelting low-grade sulphide ores. Gold and silver ores are in paying quantities, and the annual output of these two metals amounts to more than $4,000,000. While most of the mining industries are in the north, a large field of coal, somewhat inferior in quality, is found in the south; coal is carried to the sea by the Arauco Railroad, and some is exported to the more northern republics. Borax, lead, tin, borate of lime, and a few other minerals are also mined. The value of all the mineral exports from Chile in 1911 was $124,400,000, United States money.

Manufactures and Commerce. The manufacturing industries of Chile are unimportant. The natives, like most Spanish-Americans, do not take readily to manufacturing, while the foreign element is still too small to exercise a perceptible influence on the industrial life of the country. In the southern part of Chile, and especially in the German settlement of Valdivia, there are a number of large breweries, distilleries, tanneries, and saw mills. Soap, furniture, and shoes are also manufactured. The mineral products constitute about 85 per cent of the total value of the exports, and agricultural products about 9 per cent. The imports are made up chiefly of manufactured articles, and include necessaries of life, articles of luxury, also machinery and other metal products. The scarcity of labor and inadequate communication facilities will probably prevent the industrial development of the country for some time, foreign capital confining itself chiefly to the more remunerative exploitation of the mineral resources, whose rapid development has been attended by a corresponding increase in both its export and import trade, as shown in the following table:

YEARS	Exports	Imports
1855	$19,000,000	$17,000,000
1894	25,000,000	18,000,000
1905	96,801,000	68,838,000
1907	102,940,700	107,267,000
1908	118,852,725	97,618,000
1909	111,716,834	85,726,000
1910	118,955,045	108,657,000
1911	127,500,000	126,472,000

Over 35 per cent of the trade is with Great Britain. Germany figures second, and the United States third. The trade of the United States with Chile amounted at the close of the century to more than $10,000,000, and in 1911 to $17,431,969. While the exports from Chile to the United States greatly increased during the last decade of the century, the imports from the United States remained practically stationary, as the following figures will show:

YEARS	Exports from Chile to the United States	Imports into Chile from the United States
1891	$3,403,000	$3,146,000
1896	4,709,000	3,432,000
1900	7,112,826	3,288,000
1905	15,624,000	6,887,000
1910	10,810,015	5,860,733
1911	11,484,831	6,915,493

Nitrate of soda and other chemicals make up about 95 per cent of the value of the exports of Chile to the United States, while the chief imports from the United States are iron and steel manufactures (nearly 25 per cent), petroleum (less than 20 per cent), cotton textiles (16 per cent), breadstuffs (6 per cent), besides wooden articles, instruments, and other manufactures.

The chief ports are Valparaiso, Iquique, Talcahuano, and Antofagasta. The first serves mainly for imports, and the second handles most of the export trade. In 1912 the first state bank of issue, Caja de Emisión, was authorized by law. There were 19 joint-stock banks of issue at the close of 1912. These institutions guarantee their note issue by depositing gold or accepted securities with the government. The public savings banks, 72 in number, had 301,353 depositors Dec. 15, 1912. A number of land banks issue interest-bearing scrip payable to bearer, and lend money when secured by first lien on real estate.

Transportation. In regard to transportation and communication facilities, Chile stands in the front rank among South American countries. The first railway line in Chile was opened in 1852—the short line connecting Copiapó, the capital of Atacama, with Caldera, on the coast. The construction of railway lines by the state was begun as early as 1857, when the line between Valparaiso and Santiago was opened. It was not, however, until 1888 that the construction of state lines was begun on a large scale. In that year Congress authorized the construction of 12 lines by the state, with a total length of about 750 miles. In 1911 the total length of railways in operation was about 3952 miles, of which 1979 miles were operated by the state; 1828 miles were under construction at the beginning of 1912. The state lines are conducted in a progressive way in regard to equipment and management, while the rates are unusually low. Numerous new railway lines are projected,

and a number are nearing completion. The line connecting Valparaiso with Buenos Aires, Argentina, has been completed by building from Los Andes to the summit of the Cordillera, where it effects a junction with the Argentine line from Mendoza, the system being put into continuous operation in April, 1910. The Arica line to La Paz was opened Aug. 6, 1912, with a length of 127 miles in Chile and 139 in Bolivia. (For a further account of this undertaking, see *Railways*, under ARGENTINA.) Tramway lines are operated in every city of importance. The telegraph lines owned by the state had a total length of 16,513 miles in 1910. There were 5821 miles owned by private companies. The telegraph rates are very low, and the use of the telegraph and telephone is extensive, owing to the poor condition of the country roads. There were 8000 miles of telephone lines owned by the telephone and railway companies, also a wireless telegraph system with 13 stations. The shipping of the Chilean ports exceeds that of any other country in South America. In 1911, 14,698 vessels of 26,164,068 tons entered, and 14,649 vessels of 25,941,833 tons cleared. About 40 per cent of the carrying trade is done in British bottoms, and the rest in German, French, and Chilean. The Chilean merchant marine numbered, in 1911, 84 steamers of 69,604 tons net, and 91 sailing vessels, 52,918 tons net. The Chilean South American Steamboat Company under state subvention operates 12 steamers in ocean trade and 7 in river navigation. The British-owned Pacific Steam Navigation Company operates 43 steamers on the coast and to the United Kingdom, and six other British companies are in Chilean trade. The Cosmos and Roland lines afford communication with Germany, and the Italian Lloyd Pacific operates a line to Genoa.

Finance. The financial condition of Chile is far from satisfactory. The occasional wars have enormously increased the public debt, and the rapid increase in the revenue since the Peruvian War, on account of the export duties on nitrate, brought about extravagance in public expenditures.

In the last years for which a statistical return has been made the state of the national finances is shown in the following table, in terms of the gold peso, valued at 36 cents American, and the paper peso, subject to fluctuations around 20 cents:

YEARS	REVENUE		EXPENDITURE	
	Gold	Currency	Gold	Currency
1908	$65,230,892	$160,428,470	$39,102,517	$198,311,785
1909	123,088,021	245,267,030	135,169,887	300,459,758
1910. .	82,764,423	152,975,645	60,677,704	234,143,253
1911....	71,908,379	213,214,928	60,775,635	204,191,707
1912...	101,050,000	189,200,000	71,358,378	281,128,726

The external debt of Chile amounted to $85,650,000 at the beginning of 1905, and the internal debt to $39,116,000. The external debt on June 1, 1912, amounted to 336,781,600 pesos gold, or about $175,818,000. The internal debt was 180,593,372 pesos paper ($36,479,860), of which 150,366,403 represent issues of paper money. The rate of interest on the external debt varies from 4½ to 6 per cent, and the annual service amounts to about $6,000,000. The gold standard was adopted by Chile in 1895. In 1898 paper money to the amount of about $17,000,000 was issued, and a new loan of $20,000,000 was authorized for the conversion of this paper within four years. In 1901 the government decided to extend this period two years.

Government. The constitution of Chile, adopted May 25, 1833, guarantees to all citizens equality before the law, the inviolability of property, immunity from restraints on domicile and migration, and freedom of instruction, association, petition, and the press. The legislative authority is vested in a National Congress, consisting of a Senate and a House of Representatives, which meet at the capital, Santiago. The members of the lower house are elected directly by the people (one for every 30,000 inhabitants), for a term of three years, while the members of the Senate are chosen from the provinces, by the same electorate, for a period of six years, on the basis of one senator for every three deputies. Electors to either house must be 21 years of age and able to read and write. Members of Congress receive no remuneration. The executive power is exercised by a president, elected for a term of five years, by delegates chosen by the people of the provinces, to the number of three delegates for every deputy. He is assisted in the discharge of his duties by a council of state, consisting of five members nominated by himself and six members named by Congress, and by a cabinet of six ministers who preside over the departments of the Interior, Foreign Affairs, Worship and Colonization, Justice and Public Instruction, War and Navy, Industry and Public Works. The supreme judicial power is lodged in a high court of justice, located at Santiago, which is composed of seven members, and exercises control over the tribunals of the nation.

A democratic republic in form, the government of Chile in reality is more like an oligarchy than a democracy. The overthrow of the Spanish authority produced no change in economic or social conditions, and political power under the new régime remained in the hands of the great landowners who had controlled affairs under the monarchy. The great majority of the population have continued to remain content under the old conditions. The Conservative party has been dominant from the very beginning of the establishment of the republican form of government, when Spanish rule was thrown off, and has always wielded a great influence over the people at large. As a result of the monopoly of power by a small number of families, the civil service has suffered. Lucrative places under government are distributed as favors to impecunious relatives, or as rewards for political services, and the country is overburdened with public functionaries. Higher ideals of government, however, are upheld by an active Liberal opposition, which agitates its cause in Congress and in the press, and has best furthered its aims by secularizing and reorganizing public education.

The system of local government is uniform in Chile, and is characterized by the concentration of authority in the president of the republic and his agents. For administrative purposes, the country is divided into 23 provinces, which are subdivided into 78 departments and one territory, 865 subdelegations, and 3068 districts. At the head of each district is an inspector; the inspectors are responsible to the subdelegates, the subdelegates to the governors of the departments, and these to the

intendentes of the provinces. The governors and intendentes are appointed and controlled by the president. The departments constitute one or more municipal districts, whose affairs are administered by a council of six aldermen and three alcaldes, presided over by the intendentes, governors, or subdelegates, who possess a veto power. No one may be a member of the council who is connected with the state either as employee or as a contractor for the performance of some public service. The authority of the municipality extends over the matters of police (in the capitals of the departments the police are under the control of the president), sanitation, primary instruction, and the regulation of agriculture, industry, and commerce. The expenses of government are met partly by direct and indirect taxation and partly by subsidies from the general government. The council is responsible to the popular assembly, composed of all registered electors, whose sanction is required in such important matters as the negotiation of municipal loans, the inception of important public works, or the alienation of the public domains. The popular assembly, too, votes the annual budget and audits the municipal accounts as submitted by the alcaldes.

Justice is administered in the first instance by district judges in petty or civil disputes and misdemeanors, and by justices of subdelegation in more important civil suits and minor criminal offenses. Cases of greater consequence are tried, in the first instance, before the judges of letters, of whom there is one at least in every department. Appeals from their decisions lie to the courts of appeal, six in number, located permanently in the chief cities, and exercising jurisdiction over groups of provinces. The tribunal of last resort is the high court at Santiago. For national colors see Colored Plate of FLAGS.

Education. Public instruction is gratuitously provided by the state, and until recently was in an unsatisfactory condition. Steady advance, however, has been made in late years through the efforts of the progressive element among the people. A large number of teachers have been brought over from Germany, and not a little has been done towards reorganizing the educational system on the most modern principles of pedagogy and school administration. Primary instruction is provided in elementary and graded schools, controlled by district visitors and inspectors. In 1911 there were 2896 public primary schools, with 375,274 pupils and 4829 teachers. Secondary instruction is afforded by the Instituto Nacional; also by the lycées, 77 in number, of which there is one in every provincial capital and in the chief towns of the principal departments; in 1911 the number of students in the secondary schools was 20,329. The State University at Santiago gives courses in law and political science, medicine and pharmacy, the physical and mathematical sciences, and fine arts, omitting the doctorate degree as undemocratic. There are, besides, schools of agriculture and mining, seminaries, etc., for girls, a pedagogical institute, normal schools, 6 for men and 10 for women, free of all charges for the five-year course, but entailing an obligation of service as state teachers for at least seven years; an academy of painting and sculpture, a conservatory of music and oratory, and military and naval academies. In every bishopric there is a seminary for the training of the Catholic clergy. Every year the state sends to Europe, to be educated at the national expense, such students as may have distinguished themselves in the institutions of higher learning at home. Upon their return they are required to render some service to the state for a certain period, in whatever calling they may have chosen. The number of students in private institutions of different grades was 66,962 in 1911.

Population. The population of Chile, according to the census of 1885, was 2,527,320; but these figures are regarded as too high. In 1895 the population was 2,712,145, and at the end of 1910 it was given at about 3,415,000, or about 11.6 per square mile, a ratio about twice as great as that of Argentina, and Brazil. The number of foreigners in 1910 was 134,500, and included 18,755 Spaniards, 9800 Frenchmen, 10,724 Germans, 13,000 Italians, 9800 Englishmen, and natives of 10 more European countries, 27,100 Peruvians, 21,900 Bolivians. About one-fourth of the native population is of pure Spanish origin, while the remainder are either mixed or of pure Indian origin in three stocks, Fuegians, nomadic in the Strait of Magellan; Araucans, numbering about 100,000, in the south; Changos of the north coast.

Immigration, notwithstanding the energetic efforts of the Chilean government, has been rather light and attended with little success. One of the most promising colonial ventures is the German colony of Valdivia; pop., 1910, 17,681. Its success, however, has been due to the exceptional character of the colonists, as well as to the conditions under which they came. When the Chilean government, encouraged by the example of the Valdivia colony, began to encourage colonization on a larger scale, by means of foreign agencies and free passage to the country, the immigrant population became less desirable in character, and only a small proportion became permanent settlers. Still, the foreign population has played not a little part in the development of the country. Throughout Chile, nevertheless, the natural increase of population is small, owing to the utter disregard for life among the natives, and to the high rate of infant mortality, amounting to about 59 per cent among children below the age of seven.

Religion. The Roman Catholic faith is the religion of the state, and is maintained by the general government, which has the right of nomination to the archiepiscopate of Santiago and to the bishoprics of Concepción, San Carlos de Ancud (Chiloé), and Serena, and to the Vicariates Apostolic of Tarapacá and Antofagasta. Religious instruction is compulsory in the public schools, and the clerical institutions are allowed full freedom of education. The congregations are formed by the state, and the constitutional limitations on their rights to acquire property are disregarded. The priests possess an immense influence over the people, who look to them for guidance in politics as well as in matters of faith. The privilege of religious worship is accorded to other faiths by a law of 1865, with the secularization of cemeteries. Marriage was made a civil contract by the law of 1888.

Army and Navy. Military service is obligatory on all citizens between 18 and 45. The army, of which the permanent nucleus is 6000 men, ranks in importance below the navy, which, after that of Argentina, is the most powerful in South America. The national guard comprises all citizens between the ages of 20 and 40. Re-

cruits are called up in their twentieth year and are trained under arms for one year, serve for nine years in the reserve of the active army, then pass to the second reserve until 45. In 1912 the peace establishment was fixed at 19,360 of all arms and 1737 gendarmerie, the army budget calling for $6,000,000.

History. The Araucanians were the most important of the Indian tribes living in what is now Chile, and the history of the country before 1800 is mainly concerned with the continuous efforts of the Spanish to subjugate this fierce and intelligent nation. The survivors of the pure native race who still maintain their virtual independence are few; in general, the mixture of Araucanian blood with that of the Spanish conquerors has given to the Chilean race its remarkable efficiency in war. The Incas of Peru, at the period of their greatest power (1450–1533), subdued a few of the northern branches of the Araucanian race, but at the time of the Spanish conquest their dominion was not firmly established. As soon as the Incas in Peru had been overwhelmed, Almagro gathered a force for the conquest of Chile, and in 1535 started south. He spent two years and a half in the country, but, encountering little success, withdrew to Peru in 1538. In 1540 Valdivia led a second expedition into the Araucanian territory and began the real conquest of Chile. He founded Santiago in 1541, Concepción in 1550, and Valdivia in 1552, and thus secured, after much hard fighting, a permanent hold on the country.

For 250 years the history of Chile is the record of slow expansion, through the development of mines and farms, and of almost constant wars with the natives. These were finally forced to sign a treaty in 1773, which in their weakened condition they continued to respect. The governors of Chile were appointed for the most part by the viceroys of Peru, and the post was considered the regular stepping-stone to the viceregal office. The news of Napoleon's invasion of Spain and the abdication of Ferdinand VII aroused great unrest in all the Spanish-American colonies, and induced a number of leading Chileans to call an assembly which forced the Governor to resign, and, Sept. 18, 1810, organized a *junta de gobierno* to govern the land so long as the French should hold Spain. This date is considered the anniversary of Chilean independence. There followed several years of intermittent fighting with the Spanish forces in Peru, with numerous struggles between rival factions among the patriots, led by the Carrera brothers and by Don Bernardo O'Higgins. In 1814 this rivalry enabled the Viceroy, Osorio, to reëstablish his authority in the south, and to maintain it for two and a half years. In the winter of 1816–17 Gen. San Martin led an army of Argentine *gauchos* across the mountains, and by the decisive victory of Chacabuco, Feb. 12, 1817, forced the Spaniards out of Chile. A year later, on the anniversary of the battle, O'Higgins formally declared the absolute independence of Chile. The Chilean forces were defeated by Osorio on March 19, 1818, but on the Maipú Plains, near Santiago, on April 5, another battle was fought which virtually ended the Spanish domination, although desultory fighting continued for a few years, Chiloé, the last stronghold of the Spanish, being taken in 1826. It was not until 1844 that Spain formally recognized the loss of her provinces.

O'Higgins ruled as dictator from 1818 to 1823, when he was induced to withdraw, and a constitution was adopted. This was revised in 1828, and again in 1833, when substantially the same document in force at present was adopted. It has, however, been amended frequently, the most important changes being made in 1874. This constitution provides for a republican form of government, with a property qualification so high that the voters form practically an oligarchy. In 1843 the question of the Argentine boundary arose, and continued a menace to peaceful relations until 1881, when a treaty was signed which gave Chile half of Tierra del Fuego and the shores of the Strait of Magellan, providing, however, for the neutrality of this waterway. Another boundary commission was then needed to determine the exact position of the line, which was to follow the watershed of the Andes. Disputes and rumors of war continued to distract both countries until 1902. (See ARGENTINA.) Spain, in 1864–65, forced both Peru and Chile into war by a series of petty squabbles over diplomatic titles, and there followed a year of active naval warfare. Hostilities dragged on until 1869, when the United States minister succeeded in putting an end to active operations. Spain, however, refused to acknowledge herself beaten until 1871, when a provisional treaty was signed at Washington, followed by a definitive peace in 1879.

The valuable nitrate deposits in the Atacama Desert, north of Chile, were opened up by Chilean capital, but disputes ensued with Bolivia owing to the absence of definite boundary lines in the region. In February, 1879, Chile seized the Bolivian port of Antofagasta, and in April Peru, as the ally of Bolivia, declared war on Chile. The Chilean armies were outnumbered, but were far better equipped and officered than those of their opponents, and Chile's fleet was much superior. Naval operations were watched with special interest by all outside powers, as being the first between modern ironclads. On Oct. 8, 1879, the Peruvian battleship *Huascar* was taken by the Chilean fleet, and on November 19 the combined Peruvian and Bolivian forces were almost annihilated at Dolores. In October, 1880, Chile was in possession of all the disputed territory, and the United States minister succeeded in bringing about negotiations for peace. The conditions imposed by Chile were not accepted by the allies, negotiations were broken off, and the battle of Miraflores, Jan. 15, 1881, gave the Chileans possession of Lima, Callao, and practically all of the other Peruvian cities. Desultory fighting continued until Oct. 20, 1883, when a treaty dictated by Chile was finally signed. Bolivia ceded to Chile the Province of Antofagasta, while Peru gave up Tarapacá in perpetuity and Tacna and Arica for 10 years, a plebiscite at the end of that period to determine whether the inhabitants wished to return to Peru or continue under Chilean rule. The government of Chile, however, was careful to postpone such an appeal to the popular voice, and as late as 1900 the Chilean Congress rejected a convention concluded with Peru in 1898 providing for a plebiscite. In 1891 war broke out between the President, Balmaceda, and his opponents in the congress. The Congressionalists induced the principal part of the national fleet to revolt, and seized the nitrate provinces, and, with the revenue derived from them, purchased modern arms and munitions, with which they defeated the regular army near Valparaiso, cap-

tured that city, and entered Santiago (August). Balmaceda committed suicide, and order was promptly restored with the election of Jorge Montt as his successor. During the Civil War the United States had taken sides with the established government, and, as a result, after the capture of Valparaiso, there was much ill feeling against her. A number of sailors from the United States steamship *Baltimore* on shore leave were attacked by a mob, and one of them was killed. Serious complications threatened for a while, but the Chilean government eventually apologized and paid $75,000 for the benefit of the injured sailors. President Montt was succeeded in 1896 by Federico Errazuriz, during whose administration the boundary dispute with Argentina entered on an acute phase. It was settled under his successor, German Riesco (1901–06), largely through American and British good offices, and, after the settlement of outstanding difficulties, Chile and Argentina in 1902 signed a permanent arbitration treaty. The administrations of Pedro Montt (1906–10), who died suddenly while abroad after a visit to the United States, and of Ramón Barros Luco (1911–) were marked by a continuation of the period of peace and progress. Only the recurrence of periodic financial depression, due to fiscal conditions and the cost of internal administration, marred this season of prosperity. Extensive harbor improvements were made, and trans-Andean railway connection was completed with Argentina and Bolivia. The long-standing Alsop claims, which in 1909 threatened diplomatic difficulties with the United States, were adjusted through the arbitration of Great Britain in 1911, while the unsettled territorial dispute with Peru, seemingly on the way to settlement in 1912, was undetermined in 1914. Throughout 1913 the more important events in Chile were anticlerical riots in Santiago, brought about by the sale of church lands; the extensive enlargement of the navy, and efforts to monopolize the fast-disappearing nitrate deposits. The most recent general history is that of Barros Arana, *Historia general de Chile* (16 vols., Santiago, 1884–1902). Consult also: Wright, *The Republic of Chile* (Philadelphia, 1905); Aurique and Silva, *Ensayo de una bibliografia historica y geografica de Chile* (Santiago, 1902); Mansfield, *Progressive Chile* (New York, 1913); Koebel, *Modern Chile* (London, 1913); Chisholm, *The Independence of Chile* (Boston, 1911); Elliot, *Chile* (New York, 1907); Orrezo, *Chile contemporaneo* (Santiago, 1904).

CHIL'EAN GUAVA, gwä'vä. See MYRTLE.

CHILE PINE. See ARAUCARIA.

CHILI. See CHILE.

CHI-LI, chē'lē. See PE-CHI-LI.

CHILI MILLS. A machine used for pulverizing ore preliminary to recovering the values. These mills have vertical rollers running in a circular inclosure on a die. The rollers and dies may be of stone or steel. They are largely used on ores of gold-silver and the sulphides of the base metals.

CHIL'KOOT PASS. A pass in the coast range of the Rocky Mountains in Alaska. It crosses the watershed which divides the headwaters of the Yukon River from the affluents of Lynn Canal. Its greatest height is 3502 feet. It is about 29 miles long, extending from Dyea, at the head of Lynn Canal, to Lake Bennet, in the Canadian-Yukon district. It was the route taken by gold seekers in the rush of 1896–98, but has been superseded as a route by the railroad over White Pass, which was completed in 1899.

CHILLÁN, chē-lyän'. The capital of the Province of Nuble, Chile, 56 miles northeast of Concepción (Map: Chile, C 11). It is regularly built and has a Franciscan missionary church and a normal school. To the east-southeast are sulphur baths which were discovered in 1795, and to the east is the volcano of Nevado de Chillán, 9528 feet high. Pop., 1907, 34,269. Chillán was founded in 1579 and rebuilt in 1835, after its destruction by an earthquake.

CHILLICOTHE, chĭl'lĭ-kŏth'ē. A city and the county seat of Livingston Co., Mo., 86 miles northeast of Kansas City, on the Chicago, Milwaukee, and St. Paul, the Wabash, and the Hannibal and St. Joseph railroads (Map: Missouri, C 2). It has a public library, the State Industrial Home for Girls, Sisters of St. Joseph Academy for Girls, and a private normal school. The city is the commercial centre of an agricultural, lumbering, coal-mining, and stock-raising country; ships apples, eggs, poultry, wool, and hides; and manufactures staves, handles, boxes, etc. The water works are owned by the city. Pop., 1910, 6265.

CHILLICOTHE. A city and the county seat of Ross Co., Ohio, 98 miles by rail east by north of Cincinnati, on the Baltimore and Ohio Southwestern, the Cincinnati, Hamilton, and Dayton, and the Norfolk and Western railroads, and on the Scioto River and the Ohio and Erie Canal (Map: Ohio, E 7). The notable features of the city include the large public library, the city hospital, Grandview cemetery, Adena, the home of Ohio's first governor, and two attractive parks. The leading industrial establishments are the railway shops of the Baltimore and Ohio Southwestern Railroad, pulp and paper mills, and manufactories of wagons, shoes, furniture, flour, carpet sweepers, canned goods, cigars, engines, etc. Chillicothe was first incorporated in 1802 and is governed under a general law of 1902, which provides for a mayor, department of public service, president of council, treasurer, and solicitor, all elected for two years. Pop., 1900, 12,976; 1910, 14,508.

About 9 miles from Chillicothe was situated the Indian village of the same name, which in May, 1779, was unsuccessfully attacked by a band of Kentuckians under John Bowman, and in August, 1780, was burned by Colonel Clark. Chillicothe was first settled by the whites, under Nathaniel Massie, in 1796 and was the capital of Ohio from 1800 to 1810. Consult Howe, *Historical Collections of Ohio*, vol. iii (Columbus, 1889–91).

CHIL'LIES. See CAPSICUM.

CHIL'LINGHAM CATTLE. See CATTLE, CHILLINGHAM.

CHILLINGWORTH, WILLIAM (1602–44). An eminent English theologian. He was born in Oxford in 1602, educated at Trinity College, Oxford, and elected fellow in 1628. The arguments of a Jesuit named Fisher induced him to become a Roman Catholic, and in 1630 he withdrew to Douai; but his godfather, William Laud, then Bishop of London, persuaded him to reëxamine the whole controversy between Roman Catholics and Protestants, the result of which was that in 1631 he left Douai, and in 1634 returned to the Anglican Church. In 1637 he published a work entitled *The Religion of Protestants a Safe Way to Salvation.* It

was exceedingly keen, ingenious, and conclusive in point of argument. Chillingworth was perhaps the ablest disputant of his age; and had there not been a certain fickleness and want of solidity about his intellect, and a nervous suspicion that all human reasoning might be vitiated by undiscovered fallacies, he might have produced a really great work. *The Religion of Protestants* acquired a wide popularity. Chillingworth was offered church preferment, which he at first refused—having certain scruples in regard to the subscription to the Thirty-nine Articles—but afterward accepted. He became chancellor of Salisbury, prebendary of Brixworth, in Northamptonshire (1638), and master of Wigton's Hospital in Leicestershire. He was a strong Royalist and on the outbreak of the Civil War (1643) accompanied the King's forces. He died, a prisoner of war, at Chichester, Jan. 30, 1644. The best edition of *The Religion of Protestants*, along with his other works, appeared in 3 vols. (1838). For his life, consult T. Birch (London, 1742).

CHILLON, *Fr. pron.* shē'yōN', *Eng. pron.* shĭl'lŏn *or* shĭl-lŏn'. A castle and fortress of Switzerland. It is situated in the Canton of Vaud, at the eastern end of the Lake of Geneva, on an isolated rock almost entirely surrounded by water. The castle was founded many hundred years before the fortress, which was erected by the rulers of Savoy in the middle of the thirteenth century and is celebrated in connection with Bonnivard, the Genevan patriot, who was imprisoned in one of its underground dungeons from 1530 to 1536. Byron has treated this subject in his "Prisoner of Chillon." See BONNIVARD. The illustration "Alpine Scenery" in the article ALPS shows this castle.

CHILOÉ, chē'lō-ā'. The insular province of Chile, consisting of an archipelago off the west coast of South America. The group takes its name from its principal island (Map: Chile, C 12). It is separated from the rest of the republic by the Gulf of Corcovado and the Strait of Chacao, and consists of the main island and over 100 small, mostly uninhabited islets, with a total area of 8693 square miles. The principal island contains most of the population of the province. It is of volcanic origin and mountainous, covered largely with thick forests yielding great quantities of wood for export. In the eastern part the soil is fertile and well cultivated. The climate, although hot and moist, has none of the deadly qualities which characterize that of the mainland. Corn, wheat, barley, and hemp are produced extensively, and domestic animals are raised in large numbers. Pop., 1895, 77,750; 1903, 95,914; 1910 (est.), 91,657. Ancud, or San Carlos Ancud, the seat of government and chief seaport, is situated on the north coast and has a population of 3979. The archipelago was discovered by the Spaniards as early as 1558. It was the last portion of Spanish America to throw off the mother country's yoke, which it did in 1826.

CHILOGNATHA, kī-lŏg'nà-thà (Neo-Lat. nom. pl., from Gk. *χείλος, cheilos,* lip + *γνάθος, gnathos,* jaw), or DIPLOPODA (Neo-Lat. nom. pl., from Gk. *διπλόος, diploos,* double + *πούς, pous,* foot). A division of Myriopoda containing the millipedes (q.v.).

CHILON, kī'lŏn (Lat., from Gk. *Χίλων*). A Lacedæmonian, son of Damagetus, first Ephor in 560 or 556 B.C. (he is said to have originated that office). It is further said that he died of joy at the news of his son's victory in the Olympian games. He was reckoned one of the Seven Wise Men of Greece, and many pithy sayings, among them the famous "Know thyself" and "Nothing in excess," are ascribed to him. Consult Mullach, *Fragmenta Philosophorum Græcorum*, vol. i.

CHILOPODA, kī-lŏp'ō-dà (Neo-Lat. nom. pl., from Gk. *χείλος, cheilos,* lip + *πούς, pous,* foot). A division of Myriopoda containing the centipedes (q.v.).

CHIL'PERIC. The name of two Merovingian kings. CHILPERIC I, King of Soissons from 561 to 584, was the husband of Fredegunda. He did not rule over all the Franks, but divided the kingdom with his three half brothers. (See BRUNHILDA.) He was cruel, unjust, and irreligious, but energetic and brave. CHILPERIC II was King of Neustria from 715 to 720, but was conquered by Charles Martel. In 719, after submitting to the latter, he was proclaimed King of all the Franks, but ruled only one year longer. Consult Sergeant, *The Franks* (New York, 1898).

CHIL'TERN HUNDREDS, STEWARD OF THE. An English crown officer, formerly appointed to preserve peace and protect the inhabitants and neighbors of the three hundreds (nominally villages) of Stoke, Burnham, and Desborough in Buckinghamshire, from the robbers who infested the beech forests of the adjacent Chiltern Hills. This primary purpose is, however, obsolete; the office is now applied for by members of the House of Commons who wish to resign their seats, an allowable excuse for such resignation being the acceptance of a place of "honor and profit" under the crown. As such, the stewardship of the Chiltern Hundreds, among other similar sinecure offices, more generally presents itself, with its salary of 20 shillings and accompanying fees. It is rarely refused by its patron, the Chancellor of the Exchequer, and, as soon as obtained, is vacated in readiness for the next resigning member. The practice began about the year 1750. Its legality has been disputed, but numerous precedents have established it. One refusal is recorded in 1842. Consult *Standard Library Cyclopedia* (London, 1848), and Foster, *The Chiltern Hundreds* (London, 1897).

CHIL'TON. A city and the county seat of Calumet Co., Wis., 78 miles by rail north of Milwaukee; on the Chicago, Milwaukee, and St. Paul Railroad, and on the Manitowoc River (Map: Wisconsin, E 4). It is the centre of an agricultural and dairying district largely interested in barley cultivation and the manufacture of cheese, and has grain elevators, condensed-milk and canning factories, flour mills, machine shops and boiler works, brewery and malting plant, sash, door, and blind factory, etc. Pop., 1900, 1460; 1910, 1530.

CHILTON, ROBERT HALL (1817–79). An American soldier, born in Virginia. He graduated in 1837 at the United States Military Academy, rose to be captain of the First Dragoons in 1846, and major and paymaster in 1854. During the Mexican War he distinguished himself at the battle of Buena Vista. In 1861 he resigned from the United States army, in the same year was appointed a lieutenant colonel in the Adjutant General's Department of the Army of the Confederate States, and in 1862 became a brigadier general. For some time he was chief of staff to Gen. R. S. Lee, and inspector general of the Army of Northern Virginia. In 1869–79

he was president of a manufacturing concern in Columbus, Ga.

CHILTON, WILLIAM EDWIN (1858–). An American lawyer and legislator, born at St. Albans, Kanawha Co., W. Va. In 1880 he took up the practice of law at Charleston, W. Va., and in 1891 became a practicing attorney before the Supreme Court of the United States. He was appointed prosecuting attorney of Kanawha County (1883), was chairman of the Democratic State Executive Committee (1892), and Secretary of State for West Virginia (1893–97). Later he became United States Senator for the term 1911–17.

CHIMACHIMA, chē'mȧ-chē'mȧ. A caracara of the American Isthmian region (*Ibycter chimachima*), prevailingly white when adult. See CARACARA.

CHIMÆRA, kī-mē'rȧ (Lat., from Gk. χίμαιρα, *chimaira*). A mythical monster, killed by Bellerophon (q.v.) with the aid of Pegasus. According to Homer, the chimæra was a fire-breathing monster with a lion's head, a goat's body, and a serpent's tail, who long devastated Lycia and Caria. According to Servius (q.v.), on *Vergil, Æneid,* vi, 288, Chimæra represented a mountain whose top was the resort of lions, its middle of goats, and the marshy ground at the bottom of serpents; Bellerophon first made this mountain habitable. The district in which Chimæra was localized was volcanic. The chimæra alone and in conflict with Bellerophon is not uncommon in ancient art. The finest representation is the large bronze in Florence. The word "chimæra" is now used figuratively to denote any monstrous or impossible conception, the unnatural birth of the fancy.

CHIMÆRA. A representative of a family (Chimæridæ) of strange cartilaginous fishes (q.v.) constituting the Holocephali. They are sharklike and very interesting to the ichthyologist in their structure, which shows their strong affinity to ancient types of which they are the scant survivors, but have nothing but their grotesqueness to attract popular interest, as their flesh is not good. The large eggs, fertilized internally, are surrounded by a horny case which in some species may be 10 inches long. There are three living genera—*Chimæra, Callorhynchus,* and *Harriotta. Chimæra* is found along the coasts of Europe and Japan, on the west coast of North America, and at the Cape of Good Hope. *Chimæra monstrosa,* of the Mediterranean and Atlantic, is its largest and best-known species and may reach a length of 3 feet; in Europe it is called "king of the herrings"; in America, "chimæra, ratfish, sea cat," etc. *Callorhynchus* occurs in the south temperate zone, and *Harriotta* is confined to the deep seas. Consult Dean, *Chimæroid Fishes and their Development,* Carnegie Institution Publication, 32 (Washington, 1906). See Plate of DIPNOI AND CHIMÆRA.

Fossil Forms. The genus *Chimæra* is found in a fossil state in the Tertiary deposits from the Miocene upward. Many related but extinct genera are known from the Devonian upward. The chimæroids reached their maximum of evolution in the Cretaceous and Eocene, and many of the extinct species were much larger than any now living. The strong cutting teeth of *Rhynchodus* and *Ptyctodus,* described from the Lower Devonian of North America and Russia, are the only remains of the earliest members of the group, of which no other traces have been found. In the Liassic of England specimens of *Myriacanthus* have been found so well preserved as to show the form of the cartilaginous snout, which resembles that of the modern genus *Callorhynchus.* Teeth and dorsal spines of chimæroids are common in the Mesozoic and Tertiary rocks. One genus, *Ischyodus,* of which a perfect skeleton was found in the lithographic limestones of the Solenhofen Jurassic, has also been found in the Cretaceous of New Zealand and the Eocene of North America, indicating that this genus enjoyed in those early days a very wide distribution. See SQUALORAJA.

CHIMÆRA, IN PLANTS. A name applied to certain graft hybrids which combine the characters of both stock and scion. The term "graft hybrid" is applied when the stock and scion fuse in such a way as to produce new shoots that are intermediate between the two parents. In the chimæra the tissues of the two parents remain distinct from one another in the hybrid. For example, the epidermis may belong to one parent and all the inner parts to the other. In this case, when the tissue of one parent insheathes that of the other, the chimæra is spoken of as a periclinal chimæra. In other cases the hybrid is a sort of patchwork or mosaic of the characters of the two parents; these cases being called hyperchimæras. A notable case of the latter kind has been produced by a graft between the tomato and the nightshade, a shoot arising which combines the characters of both stock and scion. Of course, in all such cases the seedlings revert to one or the other of the parent forms.

CHIMANGO, shē-mäŋ'gō. A widespread and familiar carrion hawk (*Milvago chimango*) of the plains regions of South America, black, with the under parts brownish ochre in the adult. For affinities and habits, see CARACARA and the books there mentioned.

CHIMAPHILA, kī-măf'ī-lȧ. See WINTERGREEN.

CHIMAY, shē'mȧ', JEANNE MARIE IGNACE THÉRÈSE DE CABARRUS, PRINCESS DE (1773–1835). She was the daughter of the Comte de Cabarrus, Minister of Finance in Spain; was married at 16 to the Marquis de Fontenay, but divorced from him in 1793 and in the same year married Tallien, the French revolutionist, whom she induced to engage in a plot for the overthrow of Robespierre, thus becoming the chief promoter of the Revolution of July, 1794. Her social triumphs, consequent from her beauty and her free manners, gave her husband offense, and he left her, going with Napoleon to Egypt. A divorce followed on his return (1802) and Jeanne married in 1805 the Comte de Caraman, afterward the Prince de Chimay, with whom she lived peaceably. While ranking first among the beauties of the time, she was never admitted to court circles. Consult Houssaye, *Notre Dame de Thermidor* (Paris, 1866).

CHIM'BORA'ZO, *So. Amer. pron.* chēm'bō-rä'sō (native name, *Chiquipoya*). A volcanic peak, one of the highest of the Andes, in Ecuador, rising 20,500 feet above sea level, but only about 11,000 feet above the level of its own tableland of Quito (Map: Ecuador, B 4). Its lat. and long. are 1° 20′ S. and 79° W. The mountain has no crater, is built up of trachytic volcanic rocks, and is evidently an extinct volcanic peak. It is capped with perpetual snow and was long regarded as the loftiest mountain in the world. The summit was for the first time reached by Whymper in 1880. Humboldt, Bous-

singault, Hall, and Stübel all made ineffectual attempts to reach its top.

CHIMBOTE, chêm-bō'tâ. A seaport in the Department of Ancachs, Peru, situated on the Puerto Ferrol (Map: Peru, B 5). It has an active trade and is the terminus of the railroad from Huaraz, whose port it is.

CHIMENTI, kê-mân'tê, JACOPO DI. See CLEMENTI, JACOPO DI, DA EMPOLI.

CHIMERE, shĭ-mēr'. See COSTUME, ECCLESIASTICAL.

CHIMES (from AS. *cimbal, cimbala*, from Lat. *cymbalum*, from Gk. *κύμβαλον, kymbalon*, cymbal, from *κύμβος, kymbos*, Skt. *kumbhā*, jar). Music played on a set of bells in a church tower, either by a performer or by mechanism. This ancient and interesting class of music is believed to have originated in some of the German monasteries. In the fifteenth century the ringing of church chimes became very general in North Germany, Holland, and Belgium; the last-mentioned country was especially famed for its bell ringing, retaining this prestige for three succeeding centuries. Bell ringing has always reached its greatest popularity in flat countries, where the sound of the bells can "carry" over a great distance. In England, where it is often called "change ringing," this custom has also found great favor and may be said to be one of the national institutions. A chime of bells may number from 5 to 12 and is rung by swinging, causing the clapper inside to strike the bell. With this limited scale, and the rather uncertain method of producing the tone, only very simple diatonic melodies are possible. *Carillons* are more elaborate affairs, in which the bells are stationary and are rung by striking on the outside with a hammer. Carillons were formerly played by a performer, who struck the huge keys that connected with the hammer and with his feet operated the pedals that communicated with the larger bells. His place is now usually taken by machinery. The number of bells in a carillon varies from 10 to 40, or even more; the famous one at Ghent has 48. Chimes have been introduced into many American churches. Those of Christ Church in Philadelphia, Christ Church in Boston, and Trinity Church in New York are probably the oldest in the United States. The chimes of the old Christ Church of Philadelphia have an historic interest. The bells were sent from England as a present from Queen Anne, and during the Revolution they were taken down and sunk in the Delaware River, as it was feared the British might capture them. At the close of the war they were rehung in the old belfry. Among the celebrated chimes of Europe are those of Copenhagen, Ghent, and Amsterdam. The word "chimes" is here used in its general sense, including both carillons and the smaller set of bells. Consult: F. E. Robinson, *Among the Bells* (London, 1909); J. Berthelé, *Archives campanaires* (Abbéville, 1911); O. H. Metzger, *Die Glocken im Friedländischen* (Friedland, 1912). See BELL.

CHIMES, THE: A GOBLIN STORY OF SOME BELLS THAT RANG AN OLD YEAR OUT AND A NEW YEAR IN. A Christmas tale by Charles Dickens, written in Genoa in 1844 and published in London in December of the same year. It was illustrated by Doyle, Leech, Maclise, and Stanfield.

CHIMESYAN, chĭm'e-syan. A small linguistic family on the Nass and Skeena rivers, British Columbia. They comprise the Tsimshian, Sitksan, and Niska tribes. They are athletic and well formed, practice tattooing, and wear labrets, together with rings in the nose and ears, but do not flatten the head as do the more southern tribes. They are expert fishermen, weavers, and basket makers, and live in large communal houses of boards, with gable roofs and verandas. They have the clan system and are organized into three distinct social orders. Slavery also exists among them, as among other tribes of the northwest coast. They have many ceremonial customs, including the potlatch (q.v.). The name is said to signify people living 'on the main river,' i.e., the Skeena. They number now about 2450 in British Columbia, besides some 729 who have within recent years crossed the line into Alaska. (See METLAKAHTLA.)

CHIM'NEY. Any structure, vertical or otherwise, of metal or masonry, including stone, brick, and reinforced concrete, having a hollow interior or flue serving the purpose of carrying off the waste gases of combustion from a stove, furnace, or fireplace, and at the same time creating a draft. It is quite probable, since we have no record to the contrary, that the chimney was unknown in either the early Greek or early Roman house, and that the smoke from a fire was permitted to escape through an aperture in the roof. Chimneys in their very simplest form were first introduced into England about the year 1368, while in Venice it is recorded in an account of the great earthquake of 1347, that a number were overthrown there.

The action of the chimney depends upon the principle that a column of heated air is lighter than a cooler one of equal height; when therefore a flue full of heated air communicates freely by the lower part with the cooler air around it, the weight of the latter pushes the warm air up, and thus an ascending current is produced. The draft velocity of flow varies as the square root of the height. In engineering work, where the chimney has received its greatest development, it is constructed either of steel, self-sustaining or supported, brick, stone, or concrete.

The design of the structure depends upon certain conditions which in Germany are required to satisfy government specifications. The practice there, upon which American construction is largely based with more or less modification, requires that the wind pressure on the base be assumed as acting upon a full median vertical section with a force W equal to 25.6 pounds per square foot, and that the centre of pressure be taken as the centre of gravity. If this area be called A, for different forms of chimney we have the following effective pressures: for round stacks, 0.67 WA, for octagonal stacks, 0.71 WA, and for rectangular stacks, 1.0 WA. The permissible stresses on the brickwork are (1) 100 pounds per square inch for common brick laid in 1 to 3 lime mortar, (2) 171 to 214 pounds per square inch for masonry of hard-burned brick laid in lime-cement mortar, and any other unit stress may be used up to 365 pounds per square inch where the factor of safety is 10 or over. If the foundation is made of concrete, the maximum allowable stress shall be 85 to 114 pounds per square inch when the concrete is simply laid, and 142 to 214 pounds per square inch when it is well rammed. On good soil the maximum shall be 43 to 57 pounds per square inch.

Chimneys of reinforced concrete, which were

attempted on a large scale in the United States about 1901, are now successfully built of considerable heights and give eminent satisfaction. The advantages in such chimneys that make them more desirable than those of either brick or steel are (1) the smoothness of the interior surface, which reduces the friction factor, (2) the fact that concrete is a poor conductor of heat, and (3) its ability to resist high temperatures. From the standpoint of cost it comes next to steel, which is least, and is followed by brick, which is the most expensive. For durability it excels both of the others, with brick next and steel last.

That reënforced concrete can be used in structures of considerable height is shown by the chimney at Butte, Montana, which is 350 feet in height by 18 feet in diameter. Another notable chimney, which up to the time of its completion, in May of 1905, was the tallest reënforced concrete chimney ever built, was put up for the Tacoma (Washington) Smelting Company, a branch of the American Smelting and Refining Company. The height of this chimney is a little over 300 feet with a constant interior diameter of 18 feet. The construction is quite typical of work of this character and may be briefly outlined. For a distance of 90 feet above the foundation the chimney consists of a double shell, the outer being 9 inches in thickness and the inner 5 inches, separated by an air space of 4 inches, with air inlets at the bottom. Above this 90-foot section the chimney consists of but one shell 7 inches thick. At the top is a lead lining extending over the coping and to a depth of 20 feet on the interior.

The concrete used for reënforced concrete chimneys usually is composed of 1 part cement, 3 parts sand, and 5 parts gravel for the foundation, while the chimney proper is of 1 part cement and 3 parts sand. The wind pressure, which is an important consideration in chimney design, is commonly assumed as exerting a force of from 25 to 50 pounds per square foot on an area equal to one-half a vertical median section; but this is believed to be higher than is necessary, for even with a wind velocity of 100 miles per hour ability to resist 20 pounds per square foot is considered ample.

There is a chimney 230 feet high and 12 feet in diameter at the plant of the Portland, Oreg., General Electric Company, and one 250 feet in height by 11 feet in diameter at Lawrence, Mass.

Steel Chimneys are of two general kinds—those that require to be braced or supported by steel guy ropes and those which are self-sustaining. Naturally the former are less important and simpler in construction. In the latter the base of the chimney, which rests on the foundation, is usually bell-shaped, though it may be secured by means of turnbuckles, bolts, angle irons, etc. Such chimneys are usually partially lined, the object of the lining being to protect the metal skin, as it is found that it is destroyed quite quickly from various causes. Corrosion of the iron also frequently takes place, caused by the condensation of the gases of combustion upon the sides of the stack. This, in a measure, may be avoided if the chimney is given a coating or two of graphite paint.

Two very tall stacks of this type were constructed for the Maryland Steel Company at Sparrows Point, Maryland. They are duplicates, each being 225 feet high, with an internal diameter of 13 feet 9 inches. They rest on an elevated masonry foundation 13 feet above the ground and have no bracing. The weight of metal in each chimney is 77 tons, while the weight of brick is equal to 900 tons. The pedestal and foundation weigh 1600 tons, making a total of 2600 tons for this form of construction, as against 7400 tons had brick alone been used. The base is a square, 40 feet on the side, and the unit load is 1.62 tons per square foot. Inside, the shaft is lined with brick, diminishing in thickness in 40-foot sections from 7 bricks at the bottom to 2 bricks at the top.

What was believed to be the tallest steel stack in the world was under construction during 1913 at the new works of the United Verde Copper Company, at Jerome, Ariz. This chimney, 400 feet 1 inch in height from the top of the foundation to the top of the steel, has a lining 30 feet in diameter inside of the steel shell, which is 30 feet 9½ inches inside diameter. The brick lining is supported on the legs of circular angles riveted to the inside of the shell and spaced 15 feet apart, so that the weight of brick is carried directly by the entire structure and not merely by the lining itself, whose bearing capacity might thus be exceeded. Furthermore, any section can be removed at once for replacement or repair. There are connections for three flues, and the steel plates are protected from the flue gases. The total weight of the chimney is about 875,000 pounds, and it is founded on a concrete base.

Among other high steel chimneys in America is that of the Nichols Chemical Company of Brooklyn, N. Y., with a height of 310 feet and a diameter of 35 feet at base and 12 feet at the top. Notable, also, is the chimney of the Compañia de Penoles, of Mapimi, Mex., which is 300 feet high.

Brick Chimneys. The tallest chimney on record which is also built of brick is at the plant of the Boston and Montana Copper and Silver Mining Company, Great Falls, Mont., built in 1908. It is 506 feet in height, has a foundation 74 feet in diameter, an interior top diameter of 50 feet, and exterior top diameter of 54 feet, and was designed so that 60 feet additional could be added if desired. In this the barrel has a circular ring section, but the lower 46 feet, which forms the base, is octagonal in exterior outline. The chimney has four separate batters, the upper 180 feet having 1 per cent, the next 100 feet 2 per cent, the next 180 feet 3½ per cent, and the octagonal base 4 per cent. A heat-protecting lining, 4 inches thick, extends from top to bottom. The cost was about $200,000. Next in height among brick chimneys is probably the Hallsbrückner Hüt chimney near Freiburg, Saxony. It has a height of 460 feet and an internal diameter of 15 feet 7 inches, its outside diameter being 33 feet at the base and 16 feet at the top. Of more recent construction is the brick chimney of the Heller and Merz Company, Newark, N. J., 350 feet in height with an inside diameter of 8 feet. This chimney was made of special radial brick, which finds wide employment in making American chimneys, laid in mortar of 1 part cement, 2 parts lime, and 5 parts sand. It is lined with 4 inches of special brick to resist acids, and an air space of 2 inches is left between the lining and the shell. The

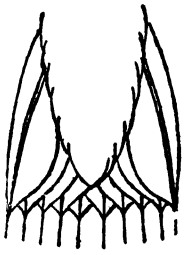
Eastman Kodak Company, at Rochester, N. Y., has a chimney 366 feet in height, with an internal diameter at the top of 9 feet 10 inches and at the bottom of 20 feet 5 inches.

Another large brick chimney is that of the power plant of the Metropolitan Street Railway Company in New York City. It is 353 feet high, with an internal diameter of 22 feet, weighs 8540 tons, and required 3,400,000 bricks for its construction. The chimney is built of two concentric shells, and the outer shell is stiffened by 12 interior longitudinal ribs projecting radially towards the inner shell and having a clearance on one-half inch. The top of the chimney is protected by a cast-iron cap.

Bibliography. Consult section on "Chimneys" in Kent, *Mechanical Engineers' Pocket Book* (8th ed., New York, 1913), where are given lists of notable chimneys and bibliographical references. Merriman, *American Civil Engineers' Pocket Book* (2d ed., New York, 1913), also may be consulted. The most satisfactory sources of information on recent practice and construction are the files of the engineering magazines and the records of engineering societies, as well as the descriptive matter prepared by various constructing engineers and manufacturers. See STEAM ENGINE.

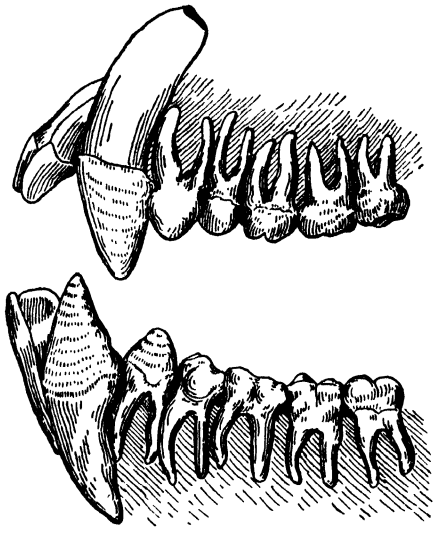
CHIMNEY SWALLOW. 1. In North America, the chimney swift (q.v.). 2. In the Old World the familiar house swallow (*Hirundo rustica*), which ranges eastward into western China, where it is replaced by another species (*Hirundo gutturalis*). Several African swallows belong to this group, as also does our barn swallow (q.v.), which English writers sometimes call, unfortunately, the "American chimney swallow."

CHIMNEY SWIFT. The small, sooty, swallow-like bird, commonly but mistakenly called a "swallow," which throngs about chimneys in all parts of North America and represents an almost cosmopolitan family. (See SWIFT.) It is migratory, spreading northward into Labrador and the fur countries in early summer and escaping in winter to Central America. Supported upon narrow wings, each an inch longer than its total length (about 5 inches) from beak to tail, it spends its time almost continuously in the air, rarely if ever alighting except inside the hollow tree or chimney where it lives, and ceaselessly pursuing, open mouthed, the minute insects upon which it lives, catching all of them on the wing and doing us an important service. It even gathers in this way the materials for the nest, grasping with its beak tiny dead twigs projecting from lofty tree branches, snapping them off and bearing them away, without a pause in its flight. Before the civilization of the country, as yet in remote districts, it inhabited hollow trees, sometimes for many generations in succession, attaching its nest to their interior wall; but as soon as houses were built, the old trees were abandoned for the new chimneys, the superior attractiveness of which lies in greater safety and in better satisfying a racial tendency to inhabit caves. In some northerly districts these birds are latterly abandoning chimneys for attics and similarly sheltered but light situations. The nest is formed of small twigs, glued together by the bird's saliva, shaped like a half-cup or hollowed bracket, and glued to the interior wall of the chimney. The eggs, four to six, are small and pure white; and it is some time after the nestlings are fledged before they are permitted to scramble out and try their wings. In these chimneys or trees the swifts sleep at night, clinging upright with their long toes to the surface, and supported upon the stiff spine-tipped feathers of the tail, firmly pressed against the wall. In accustomed and favorable places large flocks live together; and one of the most familiar and pleasing exhibitions of American bird life is to watch the swifts at sunset circling in a twittering crowd about the chimney top, into which, as dusk comes on, they drop, one after the other, as if each went down the vortex of a whirlpool. The scientific name of the common species of the United States is *Chætura pelagica*. See Plate of SWIFTS AND THEIR NESTS.



CHIMNEY SWIFT, SHOWING SPINES AT END OF TAIL FEATHERS.

CHIMPANZEE, chĭm-păn'zē *or* chĭm'pan-zē' (Guinea). An anthropoid ape of equatorial Africa, which has been known to Europeans for 500 years. The chimpanzee, though taller than an orang-utan, falls short of the stature of the gorilla and never exhibits the breadth and massiveness of frame shown by an old male of that species; 5 feet is a good height for this animal, and no great difference is observable between the sexes. This height is a matter of measurement rather than of observation, however, as the chimpanzee rarely stands upright and habitually walks bent over and supporting itself upon its long forearms and knuckles, the fingers being bent in; most of its time, indeed, is passed in trees. The range of the genus extends from the Atlantic coast of mid-Africa eastward through the forest region to the Nile, from about 10° south to 12° north of the equator. Throughout this great area it seems to be fairly numerous and is known under many names. Although it is convenient to speak of *the* chimpanzee, several species are



DENTITION OF CHIMPANZEE.

recognized, and there are probably a number of others as yet undescribed. Dr. Elliot, in the latest summing up of these animals, admits 10 species, one of which is divisible into two subspecies. *Pan* is the latest accepted name for the genus; former names being *Troglodytes*, *Mimetes*, and *Anthropopithecus*. The species are *calvus*, *fuliginosus*, *satyrus*, *kooloo-karuba*, *leucoprymnus*, *chimpanse*, *aubryi*, *vellerosus*, *fuscus*, *schweinfurthi*, and *s. marungensis*. They are strictly forest-dwelling animals, haunting the densest jungle and climbing to the topmost branches, where they go about in families or small bands, feeding almost wholly upon soft fruits, but varying their diet with grubs, insects, honey, birds' eggs, fledglings, birds, etc. This appetite causes them to wander widely in search of fresh food, and in some districts they are greatly destructive of the banana and other plantations of the natives. Simply guarding these plantations, when the fruit is ripe, is usually sufficient to save the crop, since the apes are timid towards men and run when they can; but if cornered they prove very troublesome foes to deal with, showing much courage and seeking to grasp their enemy in their long arms, chew his hands, and gash his throat with their terrible teeth. Dr. Livingstone and others say that the chimpanzee is a match for the leopard, but is quickly killed (but not eaten) by the lion. The robust natives of the central Sudan chase these animals into the tree tops, drive them into traps, and otherwise kill them off by regular hunts. They seem to be largely nocturnal and often fill the woods with loud, reiterated cries, which are varied through every variety of horrid noise; can be heard a long distance, and seem to be uttered by large troops in concert, though perhaps only a few are really screaming and bellowing together. Such noises doubtless serve the double purpose of keeping the apes wandering through the blackness of the forest night, within hail of one another and of terrifying possible enemies. No particular sleeping place seems to be made by this ape, but when one is about to become a mother, the pair build a platform-like nest in a tree top, upon which the female rests until her young one (twins are only occasional) is born and able to travel. The young are often captured and kept as tame pets by the negroes and wandering Arabs, and thus for two or three centuries the civilized world has been supplied with living examples.

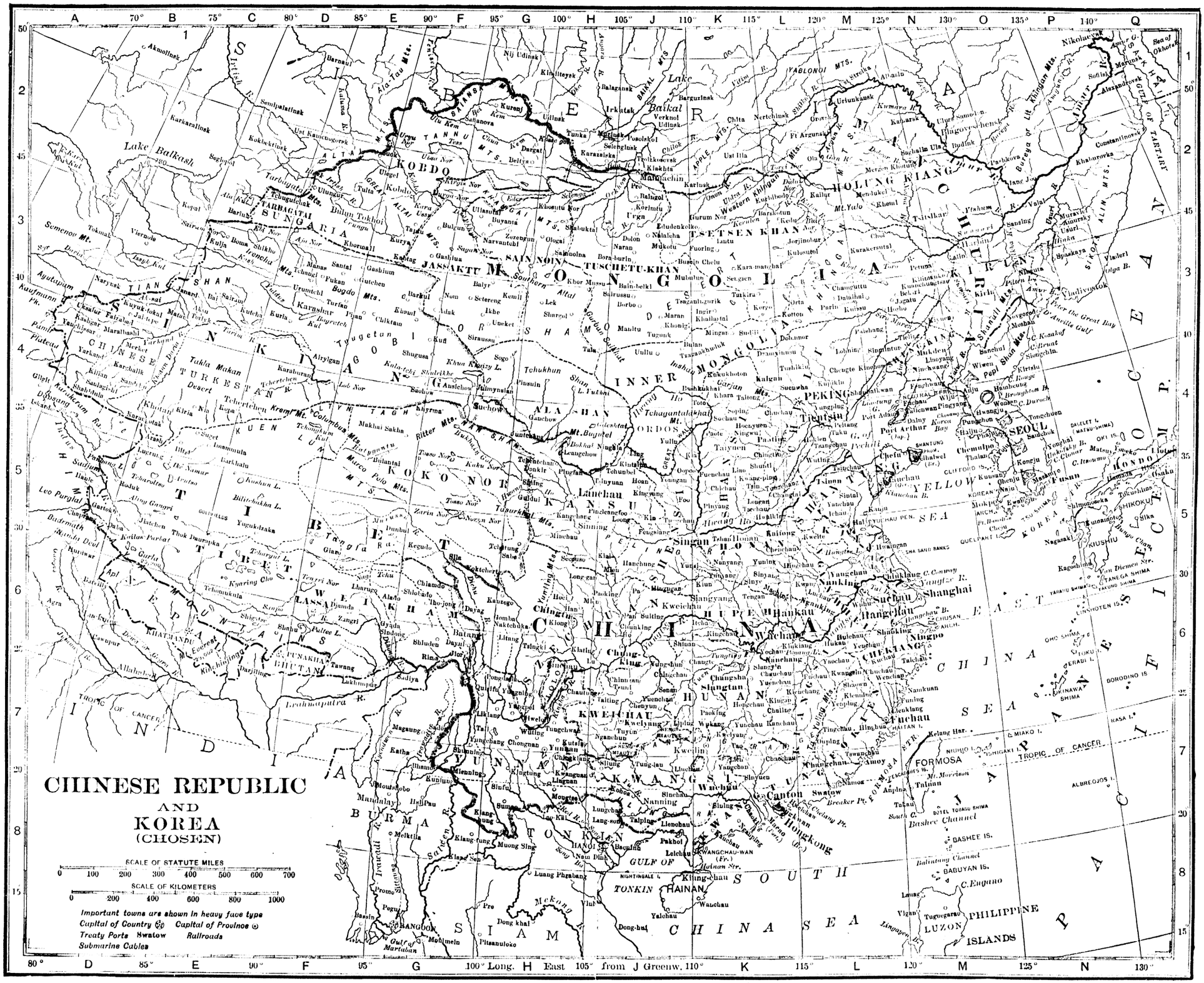
No other of the greater apes is so human in its characteristics, appearance, and intelligence, and numberless accounts exist of the interesting ways and great docility of the animal when properly treated and trained. Though it often becomes morose and savage when old (if able to survive the pulmonary diseases which kill most of its kind in youth), when young it is teachable, affectionate, and playful to a remarkable degree. Like most other animals, wild chimpanzees when young show the instinct for play as strongly developed as when confined in a zoölogical garden. So entirely human are the chimpanzees in their ways that the natives of certain tribes believe them to be relations which have been degraded from a former higher state to their present forest life.

The structural resemblance to the gorilla has been noted; but the head is rounder, and the face lacks the great ridges above the eyes and massive jaws of that animal, and the canines are smaller, while the lips are more extensile and mobile and the whole expression milder; the ears are very large and the nose insignificant. The naked skin of the face is yellowish, darkening with age, but that of the palms of the hands and soles of the feet much darker; and gray hairs often become conspicuous about the mouth and chin. The body is covered everywhere else with shining black hair, most abundant on the head and shoulders, where it hangs long and thick.

Much has been written as to these animals, especially in the works of Savage, Du Chaillu, Livingstone, Schweinfurth, and other explorers of western and Central Africa; also in regard to chimpanzees in captivity. A good general account is contained in *Cassell's Natural History*, vol. i (London, 1883); and a more scientific one in Hartmann's *Anthropoid Apes* (New York, 1886), where a full account is given of "Mafuka," the supposed hybrid between gorilla and chimpanzee, long resident in Dresden. A famous educated captive, "Sally," lived for eight years in the London Zoölogical Gardens and was the subject of psychological training and experiment, described by Romanes in the *Proceedings of the Zoölogical Society of London* (1889); and the history and exploits of another celebrated chimpanzee, "Joanna," are recorded in the same *Proceedings* (1899, pp. 296 et seq.). For the latest technical treatment of these animals, see Elliot, *A Review of the Primates* (New York, 1912). See GORILLA; ORANG-UTAN; and Plate of ANTHROPOID APES.

CHINA (Fr. *Chine*, ML. *China*, Ar. *Sin*, Pers. *Chin*, Skt. *Cina;* Gk., for the people, *Σῖναι, Sinai, Σῆρες, Sēres*, Lat. *Seres;* Turk. *Khatai*, Mongol. *Kitat*, whence Eng. *Cathay*, Russ. *Kitai*, from the race, generally held to be Tungusic, of *Kitan*, or *Khitan*, who ruled in the north of China from the tenth to the twelfth century; the natives call their country *Chung-ku*, 'Midland,' poetically *Chung-hua*, 'Flower of the Middle.' The name "China" and the corresponding ancient names (*Sinai*, etc.) are derived from the westernmost feudal state called *Ts'in*, which stood in close relations with the Central-Asiatic Tatars, and this may possibly be the channel through which it reached the countries of the West. The name *Sin* (*Sinim*), used in the Book of Isaiah in reference to the most distant nation in the East, may thus refer to those of the Ts'in state centuries before one of its sovereigns became Emperor of China in 220 B.C.). A country, formerly an empire, but a republic since Feb. 7, 1912, extending over most of the southeastern third of Asia, and embracing the whole area of continental drainage into the Pacific south of the Amur River, with the exception of Indo-China and Korea. It has an area of approximately 4,376,400 square miles. It is irregularly circular in shape, lying between lat. 18° and 54° N. and long. 74° and 135° E.; and it includes, besides China proper, Tibet, Eastern Turkestan, Mongolia, and Manchuria.

Tibet, with an elevation of 15,000 feet above the sea, is cold and sterile except in the south, where valleys teem with cultivation. To the north is Eastern Turkestan, a remarkable depression, with a central sand waste, drained by the Tarim River and bounded by lofty mountains. To the east, Turkestan merges with the high table-land of Mongolia with its summer heats and subarctic winters. To the east of Mongolia is Manchuria, with an exceptionally rich


CHINESE REPUBLIC
AND
KOREA
(CHOSEN)
SCALE OF STATUTE MILES
0 100 200 300 400 500 600 700
SCALE OF KILOMETERS
0 200 400 600 800 1000
Important towns are shown in heavy face type
Capital of Country Capital of Province
Treaty Ports Swatow Railroads
Submarine Cables
Long. East from Greenw.
INNER MONGOLIA
OUTER MONGOLIA
MANCHURIA
SIBERIA
TIBET
CHINESE TURKESTAN
KOREA
FORMOSA
PEKING
Tientsin
Hankau
Shanghai
Nanking
Hangchau
Canton
Hongkong
SEOUL
Lake Baikal
Lake Balkash
YELLOW SEA
EAST CHINA SEA
SOUTH CHINA SEA
PACIFIC OCEAN
SEA OF JAPAN
INDIA
BURMA
SIAM
TONKIN
GULF OF TONKIN
HAINAN
PHILIPPINE ISLANDS
LUZON
TROPIC OF CANCER

serviceable through its feeders from Nanking to Peking, was formerly the route of the great fleet of vessels bearing the tribute of rice to the capital. Artificial rivers and canals greatly aid navigation in China.

The Great Wall. The Chinese rarely use stone for architectural purposes, except in commemorative arches and bridges, and chiefly for trimming or paving; they are much given to the use of brick. The great wall is surfaced with brick. This wall, one of the most stupendous works ever conceived and executed by man, was primarily erected towards the close of the third century B.C., in sign of the destruction of the feudal system in China, and of the unification of the many provinces into an empire by Shi-Hwang-ti, i.e., 'first' Emperor of the Ts'in dynasty. It has been preserved and extended through many reigns with the futile idea of keeping back the Tatars. About the year 1547, under the Ming dynasty, its length was increased by about 300 miles. At the present time it is, along large parts of its course, little more than a mass of débris. It is 25 feet thick at the base and 15 feet at the top, with towers at intervals of about 100 yards. It is over 1500 miles long, stretching over high hills and very deep valleys and across rivers. Beginning at the western frontier of Kiang-su, it follows the general eastward trend of the mountains, making great bends north and south. In Shan-si it has a long loop embracing over half the province and forming double walls many miles apart. It reaches the sea at Shan-hai-kwan.

Climate. China lies mainly in the north temperate zone, the extreme southern portion only being within the tropics. Lying on the eastern side of the Continent, with most of its area within the region of the prevailing westerly winds, it has a continental climate, with considerable range of temperature throughout the year, except upon the immediate seacoast. The mean annual temperature at Peking, in the north, is 51°; at Canton, in the south, 69°. At Peking the monthly range of temperature is from 79° in July to 23° in January, while at Canton the corresponding figures are 82° and 55°. The temperatures at Canton are greatly modified by the monsoon winds, to which the south coast is exposed. Inland the range of temperature is much greater. On the whole, the climate shares the extreme character of all continental east coasts, i.e., it is cold and rough in the winter and excessively hot in the summer.

The rainfall is greatest on the south coast, where it often exceeds 100 inches annually, and diminishes northward. At Hongkong it is 90 inches, at Peking 24 inches. It is greatest on the coast and diminishes inland over the inhabited areas, though it is in most parts of China and in most years sufficient for the needs of agriculture; still, disastrous local droughts have occurred, causing famines. The coincidence of most of the rains with the summer months enables parts of north China to grow cotton, sugar cane, and other products that are usually confined to warmer latitudes.

Flora. Tea, rice, the mulberry, and bamboo are the four most valuable vegetable products—the first for drinking (not usually taken at meals), the second for food, the third for the production of silk, and the fourth for the construction of habitations and implements. The vast area and climatic conditions of China allow a wonderful variety both of natural products and of products grown by man. Northern China is remarkably bare of trees, shrubs, or herbage, except shade and fruit trees, crops, and, on steep hillsides, strong-rooted grass. This is the work of man, who has destroyed vegetation in supplying individual need. The tallow, varnish, and camphor trees, pine and banyan, cypress and mulberry, flourish. The mulberry is cultivated by the millions, but rather as a bush, and almost wholly for its leaf, which is the food of silkworms. In the south the coconut and other kinds of palm, with the subtropical fruits and nuts, are numerous. Among the fruits, those of the Occidental genera prevail in the north, such as apples, pears, grapes, peaches, many excellent varieties having been introduced from America. In the south the oranges, pineapples, pomeloes, mangoes, li-chi, bananas, and many fruits of native growth without European common names, enable most of the inhabitants to enjoy fruit throughout the year. The bamboo, of which over 60 varieties have been described, is of all sizes, furnishing not only its young sprouts as food, but serving numberless purposes. What iron is to the American, bamboo is to the Chinese. It is used in the building trades, in the decorative arts, and in the manufacture of furniture and utensils and also of paper. It plays an important part in pharmacy. It furnishes themes for Chinese poets. "Order used to be maintained throughout the whole Empire by it, and a sprig of it is borne in the van of the funeral procession." Many plants now common in the West, such as camellias, azaleas, and gardenias, are natives of China; on the other hand, quite a number of cultural plants have been imported into China from abroad, such as the jasmine shrub and the henna plant, brought to Canton by Western traders during the early centuries of our era.

Fauna. The vast tracts of sparsely inhabited country, and the wide variations of elevation and climate, cause considerable differentiation in the fauna. Tigers, panthers, leopards, wild cats, civet cats, tree civets, and martens, black and brown bears, 20 species of bats, several varieties of monkeys, wolves, foxes, antelopes, deer of 11 kinds, including three of the musk deer, and, in Yün-nan Province, the elephant, rhinoceros, and tapir, are some of the wild animals. The water buffalo, cattle and horses (few in number), sheep and goats, mules and donkeys, pigs, weasels, otters, badgers, stoats, sea otters, moles, muskrats, hedgehogs, hares and rabbits, 12 kinds of squirrels, and 25 species of rats and mice are known. The lists of Swinhoe and David contain 200 species of mammalia. Sea food is so abundant that in Macao one may have a different kind of fish for breakfast every morning in the year, it is said. Porpoises, fin whales, eels, sharks, and sturgeons are numerous off the coasts; and alligators, snakes, frogs, and tortoises abound. Of birds, over 700 species have already been described. The entomology has been very little studied. Locusts in swarms often do great damage, and scorpions, the mantis or "praying beetle," centipedes, fireflies, and beetles are found everywhere.

Geology and Mineral Resources. Our knowledge of the geology of China is still based largely upon the wide researches of Pumpelly and Von Richthofen, supplemented recently by those of other explorers, such as Bailey Willis, and especially by mining and railroad engineers. The prolongations in China of the Kun-lun

Range are almost wholly composed of granites, gneisses, and other crystalline and some eruptive rocks, and approximately mark the boundary between very distinct formations to the north and south of them. To the south the predominating formation is a vast area of Jurassic strata, including all the Red Basin of Sze-chuan which, with irrigation, has been made the most productive part of China; carboniferous limestone is also conspicuous in the south. To the north the prevailing rocks were said by Von Richthofen to be carboniferous limestone, but the fossils discovered by Bailey Willis have proven it to be limestone of Ordovician age. This geologist also discovered on the Yang-tse, as far south as the latitude of New Orleans, a large body of Glacial deposits of Cambrian age. This demonstrates the existence of Glacial conditions in a very low latitude in the early Paleozoic. His observations also show that the history of mountains in North America and China run closely parallel in time, in manner of development, and in resulting features of relief. The recent studies of specialists in western Asia and central Europe extend the same generalization to those regions, and this is a point of prime interest in the comparative geology of the continents.

One of the problems of China's geology has been the extensive and thick mantle of yellow earth with fine texture and vertical structure to which Von Richthofen gave the name of loess. It spreads over a vast area in east China, especially in Shen-si, Shan-si, Ho-nan, and Hu-peh, and even extends in small areas to the south of the Yang-tse. It forms a remarkably fertile and friable soil, so porous however that much rain is required to keep it in good condition for cultivation. Many of the beds are hundreds of feet in thickness, and great quantities of it are carried by the Huang-ho and other rivers to the ocean, tinting its waters; hence the name of the Yellow Sea. Von Richthofen maintained the theory that the material is wind-carried dust from the deserts of Central Asia. Later students, in view of the enormous mass of the loess, incline to the opinion that both rivers and winds contributed to the deposits. Rock débris borne to the sea is adding to the eastern land area.

The mineral resources of China are enormous, and the most important is coal. Such researches as have been made since Von Richthofen only confirm his judgment as to the vast extent and richness of these fields. Those in eastern Shan-si and southern Hu-nan stand out above all others in richness. The Shan-si anthracite field has an area of about 13,500 square miles with seams up to 40 feet and everywhere at least 15 feet in thickness, the fuel being equal to the best Pennsylvania anthracite. The western half of this province is nearly as rich in bituminous coal. Southeastern Hu-nan is one great coal field, but in about one-half of the area, which is 22,000 square miles in extent, the coal is buried too deep to be mined. Sze-chuan, Kan-su, Pe-chi-li, and Shan-tung are the other provinces that are especially rich in coal. Iron ores are also widely diffused, but only ores that may be easily smelted by native methods are as yet utilized. Such ores exist in great abundance throughout the Shan-si coal fields, and the fact that coal and iron are near together in three of the mining regions of Manchuria gave rise to the iron industry of that country. Iron ores are sparsely distributed, however, in the coal regions of Hu-nan. Considerable gold is washed out of the sands and gravels of many streams in the Red Basin of Sze-chuan, and copper is mined in the same region for minting the current coin of the realm. The tin mines of Yün-nan are confined to an area of about 10 square miles west of Meng-tse. Silver, lead, zinc, and salt are among other minerals and metals.

Agriculture. China is essentially an agricultural country, the bulk of the people being tillers of the soil. Agriculture is held in the highest honor, the farmer ranking, in theory at least, next to the scholar, and before the merchant and artisan, in the four classifications of the people. With solemn ceremonies the Emperor, in the Temple of Agriculture in Peking, annually used to inaugurate the farming season at the spring equinox. China has a more equal distribution of land than any European or American nation, estates of a few thousand acres being rather rare, and a plot of 10 acres being considered a good-sized farm. Nominally the land belongs to the government, and as a matter of actual practice a man's title to his land ceases as soon as he fails to cultivate it. Owing to the great congestion of population, extremely small subdivisions of acreage are the rule. However, as it results in a highly intensive method of cultivation, it is by no means an unmixed evil, for the land is cultivated with a care and an intelligence unrivaled in the world. The system of rotation of crops has been adopted since time immemorial, and such a high appreciation is shown of the value of fertilizers that no part of the animal and vegetable refuse is wasted. Not satisfied with cultivating every inch of fertile land, the Chinese proceed with wonderful patience and endurance to create artificial fields wherever they can find place for a layer of soil. Thus, it is a matter of common occurrence to meet in Chinese waters floating fields consisting of large rafts covered with earth. Another and more important extension of arable land is by means of the so-called terrace fields, which are formed by covering the mountain slopes with fertile soil. Even the shifting sand fields are gradually converted into rich ground. The implements of the Chinese are crude and clumsy. They cannot buy expensive farm machinery, for their holdings are too small. Irrigation is highly developed, and the country is covered with canals and ditches—even the terrace fields on the mountain slopes have abundant water.

The chief agricultural products of China are grain, cotton, and tea. Of grain, rice is the most important staple, and is raised largely in the middle and southern parts. In the north wheat, corn, buckwheat, oats, and a little rice are produced. Tea is grown mostly in the south, although its cultivation is carried as far north as lat. 31° N. It is planted, as a rule, on the mountain sides sloping to the south, and in soil composed mainly of loam. The tea bushes yield three crops a year—April, July, and August. (For further details, see TEA.) Cotton is raised as far north as the Province of Shan-si, but only in the low valleys here. The provinces in which it is considerably grown are Shen-si, Kiang-su, An-hwei, Che-kiang, Hu-peh, Kiang-si, Hu-nan, and Kuang-si. Tobacco is cultivated throughout China, and the opium-smoking habit, though now suppressed by government, may yet call for the cultivation of the poppy here and there. By an Imperial decree of 1908 the plantation of poppy was to have been eradicated by the year 1915. Cane sugar is successfully produced in four

southern provinces—Che-kiang, Fu-kien, Kiang-si, and Kuang-tung; indigo in Che-kiang and Kiang-si; and hemp in two middle provinces—Hu-nan and Shen-si. The silkworm culture centres in the Province of Kiang-su and in the delta lands south of Canton City. The vegetables include carrots, peas, cabbage, pepper, garlic, and beans. Stock breeding claims little attention. Milk, butter, and cheese are practically unknown, and eggs, fish, and game are considered more important than the flesh of domestic animals.

Manufactures. The Western world is under a great debt to China for many inventions which have been brought to Europe and there improved. For many centuries the Chinese alone had silk, paper, jade, porcelain, the art of printing, the magnetic needle, and gunpowder. They excel in whatever requires patience and routine skill. For political reasons, western machinery was formerly discouraged, but is now being rapidly applied. Materials used are silk, cotton, linen, bamboo, clay, and wood. Printing by means of wooden blocks and also by movable type was known in China from an early age, and many books thus made and still extant are older than the time of Gutenberg and Koster. However, the invention of movable type, so strikingly useful in a system having but 26 phonetic letters, is of far less value when tens of thousands of characters are used. The making of porcelain goes back to about the year 600 A.D., though the question of its discovery depends, of course, largely on the definition of the term "porcelain" in the technical sense. Their weaving, embroidery, engraving on wood, stone, and metal, fine gold and silver work, ivory carving, lacquer ware, and bronze casting are worthy of high admiration. Foreign methods and machinery have been introduced, and native spinning, weaving, and flour mills, iron-works producing rifles, cannon, steel rails, and other iron and steel products, match factories, and some other industries conducted on Japanese or Western lines are making progress. Most of these establishments are under the supervision of foreigners.

Transportation and Communication. There are many roads throughout the well-settled parts of China, but they are in bad repair and are almost impassable for wheeled vehicles; but broad macadamized roads have been constructed in the larger towns, where land was available. The navigable rivers furnish many avenues of commerce, and these, with canals, carts, wheelbarrows, and porters, carry a vast volume of trade. The railway question may be said to be the pivotal matter of Chinese economic and political life. Great strides have been made, although lack of funds has been and still is an impediment in carrying out the several plans. The immense extent of territory and the wretched condition of Chinese highroads combine to hinder commercial intercourse between the various parts of the country. Heroic sacrifices are being made to improve the highways and to complete a series of trunk and subsidiary lines connecting the chief towns and ports. Railways were introduced as concessions to rival foreign claims for trading privileges; but, as the necessary capital and experts are lacking in China, the subject of railroads has become a politico-diplomatic matter, each Power endeavoring to secure concessions for what are expected to be the most profitable roads, as well as for such as may have strategic value should a partition of China or a conflict of foreign powers in her territory eventually take place. Railway building in China is in its infancy; but some of the lines that will become main trunk roads have not only been mapped out, but actually surveyed, and all preliminary steps, such as securing government concessions and financial backing, have been taken.

Mr. Liang Tun-yen, who studied at Yale University, was placed, in May, 1914, in charge of China's railways as Minister of Communications. He set about developing the plan prepared for Dr. Sun Yat-sen by several American experts. At the end of 1912, with 5886 miles of railway in operation, China proper had 0.3 mile of line to every 100 square miles. This is very little, but progressive, and China will soon have a respectable net of lines, if funds required are obtainable.

Railroads would have been introduced long ago if it had not been for the hostility of the Chinese government. The first railroad, built in 1876 between Shanghai and Wu-sung, was thronged by the people, but in a year was bought and destroyed by the authorities. The next line was from the Kaiping collieries, northeast of Tientsin, to navigable water, and this was followed, in 1897, by a line 73 miles long from Tientsin to Peking, which was so successful that it was soon double-tracked. The expected has happened. It is not only that railroads are a part of the new government policy of development, but also that existing lines have been object lessons to the nation, and their advantages have been so conspicuously demonstrated that regions which do not yet possess them are beginning to demand them. The Chinese themselves are eager to participate more largely in the building and ownership of railroads. As it is, the Chinese government is closely in touch with all railroad enterprises and projects. All the companies are subject to the regulations imposed by the Department of Railroads, forming under the Republic the first division of the Ministry of Communications; no road can be built except on the authority of a government concession, and concessions are withdrawn if development does not go forward as stipulated. Many concessions have been granted, and the building of railroads is in progress in many parts of the country. Most of the detailed information on the geography of large parts of China has come from foreign engineers who have been looking for favorable railroad routes. Thus the Americans, under Mr. Parsons, made a distinct contribution to our knowledge of the largely unknown Province of Hu-nan while selecting a route from Hankow to Canton; and the British have surveyed most of the country to the east of Sze-chuan in seeking a favorable route through the mountains by which this rich region may be tapped. The aims chiefly in view are to construct trunk lines like that from Peking to Canton, now partly completed; to build feeders from these trunk lines, especially to the coal and iron fields, so that their commodities may be cheaply moved; and to construct lines from the leading ports to interior cities that are great collectors and distributors of commerce in the regions around them. The Chinese railroads that were in operation, being constructed, or were still merely projected in 1912, may here be briefly noticed. In all there were in 1912 about 5886 miles of road in operation and 2300 additional under construction.

The railways of China may be more or less accurately divided as between government railways, railways constructed under foreign concessions, and provincial railways. The government railways are financed in various ways—some through loans by the government and some through loans by private parties. The following are the principal government railways.

The Canton-Hankow has in operation 209 miles of main line and 32 miles of branch lines on what is known as the Kuang-tung section and 560 miles of main line and 65 miles of branch lines, part of which is open for traffic and part still under construction in 1912 on the Hupeh-Hunan section. The Kuang-tung section was built under the direction of a Chinese engineer, Jeme Tien-yu. The Hupeh-Hunan section is being built under the direction of a British engineer, A. H. Collinson. The gauge of both sections is 4 feet, 8½ inches. The Kuang-tung section is being built by a Chinese company with a nominal capital of $40,000, of which it is understood the paid-in part has been subscribed for in China, largely in Canton. The Hupeh-Hunan section is being financed by a foreign loan from British bankers, amounting to about £6,000,000.

The Peking-Hankow, which was begun in 1898, was opened for traffic in December, 1905. The gauge is 4 feet, 8½ inches, and the main-line mileage 755 miles, with 62 miles of branch lines. The engineer in charge of construction was a Belgian, Jean Jadot. The cost of construction is estimated to be about $87,960,000, and the capital was raised largely in France and Belgium, there being, however, a £500,000 loan by British and French bankers jointly. In 1911 the company earned gross $11,311,536, and its expenses, presumably exclusive of any interest charges, amounted to $3,642,043. The remarkably low operating ratio is worthy of attention. The total tonnage of freight carried in 1911 amounted to 1,854,370, and the total number of passengers carried, 2,147,586. There is no available data to show what the average length of haul for freight or the average length of passenger journey was, but the receipts from freight amounted to $7,657,559 and from passengers $3,653,977. Even if the average haul of freight were 200 miles, which would be an unusually long average haul for an 800-mile road, the total ton mileage would be 371,000,000, and if the passenger journey averaged 100 miles, which again is taking an extremely long average, the total passenger mileage would amount to 214,800,000, and under this assumption the average receipts per ton per mile would be two cents, and per passenger per mile 1.7 cents. It will be seen that while the ton-mile receipts look very high as compared with American or European freight rates, the receipts per passenger per mile are correspondingly low. With the very low rate of wages in China it is not therefore surprising that the operating ratio should be so very much better than that shown on either American, English, or European roads.

The Shanghai-Nanking is probably the best-built railroad in China. It was begun in 1904, and the first 80 miles were open for operation in July, 1906. The last section from Chinkiang to Nanking was opened in April, 1908. The total mileage operated is 203 miles. Fifty-four miles are double track. The gauge is 4 feet, 8½ inches, and many of the cars and some of the locomotives were ordered from the United States. The road was built largely through British loans, and expenditure for materials and supplies was under the supervision of English engineers. The road runs over a nearly level country, but is the most expensive in China; its construction cost was about $50,000 per mile. In 1911 the company earned $2,251,072, and the expenses for that year amounted to $1,490,186. The great bulk of the business done is passenger business. The total number of passengers carried in 1911 was 4,672,335; the tonnage of freight carried exclusive of live stock was 314,516 tons. Passenger fares per mile on this road are about 2 cents, first class, 1 cent, second class, and ½ cent, third class. There is a fourth-class rate for coolies, averaging about ⅛ cent per mile. Approximately 95 per cent of the total passenger business is third class.

The Peking-Kalgan was begun in 1905, and, in 1913, 218 miles were in operation and about 140 miles projected but not completed. Taotai Jeme Tien-yu was the engineer in charge of construction. He was a graduate of Yale University of the class of 1883. The line was built very cheaply, and Chinese newspapers generally base their plea for having Chinese railroads built without the supervision of foreigners on the very much lower cost of the work done in this way, contrasting the cost of the Shanghai-Nanking with the Peking-Kalgan. The capital for building the road was largely the surplus earnings of the Peking-Mukden. The road runs over the Nankou Pass; this part of the line represents the most difficult railroad construction in China. Trains are broken up into two sections, and at one place on the line a switchback is employed. Passenger trains are taken over the pass with Mallet locomotives, and freight trains with the American-geared Shay locomotives, such as are used on the coal branches in West Virginia on the Chesapeake and Ohio Railway.

The Kiangsu-Chekiang, about 78 miles long, was begun in 1904 and was opened for operation in 1906. The line was built entirely with Chinese capital and has $10,000,000 which was subscribed by about 53,000 stockholders. Some idea of labor costs on Chinese railways may be had from the fact that an engineman's wages on the Kiangsu-Chekiang are from $28 to $37 per month, and station labor is paid from $8.50 to $16 per month.

The Tientsin-Pukow was built in two sections. The northern section, about 455 miles, which is known as the German section—a German engineer was in charge of the specifications for material, etc.—was begun in 1908, and various subsections were opened at different times in 1910, 1911, and 1912. The southern (British section) will be about 236 miles long when completed, and a part of the line was opened for traffic in 1912. The Revolution had very much hampered the completion of this line, but the country traveled is one in which a large amount of freight traffic originates, most of which now goes by the Grand Canal.

The principal foreign concessionary railroads in China are the Chinese Eastern, the South Manchuria, the Shantung, and the Yün-nan.

The Chinese Eastern was begun in 1897 with Russian capital, and the engineer in charge of the construction was a Russian, M. Turgovitch. There are in operation about 1078 miles of road, which is of 5-foot gauge. The line was opened

for operation in 1901, and after the Russo-Japanese War the southern portion, from Kuanchengtze to Tairen, was turned over by the Russians to the Japanese. The road carried, in 1910, 1,362,644 passengers and 1,141,200 tons of freight.

The South Manchuria Railway was opened for operation in 1907. A part of the road, as mentioned above, had been begun by the Russians and was ceded to Japan under the Treaty of Portsmouth. The gauge was changed to 4 feet, 8½ inches. In the year ended March 31, 1912, the road carried 3,158,270 passengers and 4,705,690 tons of freight.

The Shantung was built with German capital, is about 256 miles long, and began operation in 1904. The Yün-nan was built with French capital, is meter gauge, and was opened for operation in 1910. It is part of the Chemins de fer de l'Indo-Chine et du Yün-nan, of which about 289 miles are in China.

Early in 1914 it was reported that the Chinese government had granted to Japan the right to build about 1250 miles of railway in Manchuria. The several lines included are as follows: Ssupingkai to Taonaufu, about 190 miles; Changchun to Taonaufu, about 150 miles; Taonaufu to Jehol, about 454 miles, or to Hulutao, about 364 miles; Kaiyuan to Kirin via Hailungcheng, about 220 miles, and from Kirin to the Korean frontier, about 212 miles. It is said that the construction work will be done by the South Manchuria Railway, with whose lines the proposed ones will be connected. The first line to be constructed will be that between Ssupingkai and Taonaufu. At the present time the existing highway between these two points is 230 miles long. The railway will be but 190 miles in length. The estimated cost is about $4,980,000, or $25,896 per mile. There will be no great engineering difficulties or unusually expensive construction work, with the exception of a bridge across the Liao River. Japan will probably have to negotiate a foreign loan for this work, and it is supposed that, if a loan of $9,960,000 can be negotiated under favorable conditions, the line between Kaiyuan and Hailungcheng will also be undertaken in 1914. The purchase of such materials as will be required from abroad will be made at Dairen, where the South Manchuria has its general offices.

An Imperial edict of May 9, 1911, ordered that all trunk lines under construction or projecting in China were to be taken over by the government, and branch railways were to be built by local interest or presumably provincial governments. This order was one of the contributing causes of the Chinese Revolution. Dr. Sun Yat-sen, after he resigned as President, made a study of China's railway needs and recommended the building of three main trunk lines: (1) from Hainan through the provinces of Kuang-tung, Kuang-si, Kuei-chow, and Sze-chuan to Tibet; (2) from Shanghai through Kiang-su, An-hwei, Honan, Shen-si, Kan-su, and Sinkiang to Ili; (3) from Chinwangtao in the gulf of Chihli through the peninsula of Liaotung and through Mongolia to Urianghai. The National Railway Union, which met in Peking to consider Dr. Sun's proposals, recommended that No. 1 be extended westward to Constantinople, and that No. 3 should be a trunk line connecting Peking with Tomsk in Siberia. This work was to be done by granting concessions to foreign syndicates for the construction and operation of the roads for 40 years, at the end of which time the roads were to revert to the Chinese government. Dr. Sun is now engaged in trying to interest foreign countries in these proposals and in getting the necessary concessions from railroads and companies who already have franchises for parts of the routes covered in his proposals.

In 1908 the government took over all telegraph lines in China. There are in operation in China about 36,339 miles of telegraph lines (1912) and about 102 miles of underground cables. There are about 561 telegraph stations. On June 1, 1912, a uniform charge for telegrams (in a foreign language) was adopted at the rate of 9 cents per word for all places in the same province and 18 cents per word from stations in one province to stations in any other; and 6 cents and 12 cents respectively for telegrams in Chinese.

The Chinese postal service, which had originated from a side department of the Maritime Customs under Sir Robert Hart, was in May, 1911, transferred to the new Ministry of Posts and Communications, where it now forms a special department under a Chinese and a French director. Although the unsettled state of affairs in China has somewhat interfered with the regularity of its working, the new service justifies all the hopes placed in it. At the beginning of 1912 more than 6000 postal establishments were in existence, and the statistics of articles dealt with show most noteworthy increases. The service is being gradually extended to Chinese Turkestan and Tibet.

Commerce. Commercial relations between China and foreign countries have existed ever since the great expedition to western Asia of the general Chang K'ién at the end of the second century B.C., when the markets of Central Asia and the countries of the Mediterranean began to exchange their products against Chinese silk, skins, and iron. This trade was carried on by caravans through Eastern Turkestan to about the middle of the second century A.D., when ocean trade connections were added with a city called Cattigara, probably on or near the coast of Tungking, as the terminus of western navigation. It appears that Syrians and Indians were the principal traders in that period. They were followed by Persians of the Khalif Empire, who monopolized Oriental trade up to the fifteenth century, when the Portuguese arrived in India via the Cape of Good Hope. Trade was during this period carried on under the name of "tribute," the Chinese court receiving and trading in tribute goods, for which counter gifts were bestowed. That these counter gifts were equivalents encouraging regular traffic may be concluded from the continuous tribute missions arriving from Arabia, India, and other foreign countries as registered in Chinese records. The Portuguese established a trading port in China as early as 1522, and trade was thenceforth carried on almost without interruption by them and the Dutch, the English, and the Americans; but these secular relations lacked stability and safety, owing to the refusal of the Chinese government to grant suitable protection and to its avowed hostility to foreigners. Only since 1842, the year of the conclusion of the Treaty of Nanking, which followed the so-called Opium War with England, has commerce enjoyed the official sanction of the Chinese government in specially designated ports. The number of these ports steadily increased as one or another European power succeeded in wringing concessions from China. At the end of 1912

trade in foreign bottoms and under foreign treaty regulations was carried on in 48 different ports and stations. The more important ones are enumerated below, together with the estimated gross values with which they participate in the total trade of China.

PLACE	GROSS VALUE OF THE TRADE		
	1905	1911	1912
Newchwang	$34,428,000	$42,981,420	$37,274,900
Chinwangtao	14,498,000	7,031,480	6,834,640
Tientsin	59,505,000	86,237,380	75,671,920
Chefoo	23,288,000	22,622,540	21,264,640
Kiaochow	14,445,000	34,145,080	40,486,880
Chungking	18,180,000	21,562,860	19,652,540
Ichang	2,282,000	3,556,440	4,111,220
Shasi	998,000	2,179,260	4,098,120
Changsha	4,168,000	1,309,060	16,308,020
Yochow	371,000	2,557,440	4,650,900
Kiukiang	17,545,000	25,657,280	25,649,880
Wuhu	22,803,000	15,859,680	21,814,440
Nanking	7,612,000	6,706,620	9,081,280
Chinkiang	21,747,000	17,375,200	15,952,180
Shanghai	131,450,000	14,597,240	137,573,400
Shoochow	2,929,000	5,091,200	8,414,540
Hangchow	11,712,000	13,096,520	14,952,440
Ningpo	12,817,000	16,443,540	16,503,480
Wenchow	14,369,000	1,969,520	2,775,000
Santuao	1,761,000	2,128,240	2,690,160
Foochow	13,005,000	12,799,040	13,344,420
Amoy	9,918,000	15,105,620	14,453,420
Swatow	22,777,000	38,047,840	42,469,340
Canton	67,875,000	75,645,576	71,166,540
Kowloon	29,786,000	32,743,520	29,010,220
Lappa	8,125,000	13,490,200	12,750,200
Kongmoon	2,728,000	4,071,480	4,892,880
Samshui	2,921,000	4,206,900	4,567,280
Wuchow	6,865,000	7,886,920	9,084,240
Nanning		3,478,740	5,205,160
Kiangchow	5,309,000	4,007,100	3,947,160
Pakhoi	2,250,000	1,819,920	1,876,640
Mengtsz	7,675,000	8,432,300	14,481,800
Tengyueh	1,344,000	1,246,160	1,854,980
Total	$495,030,000	$565,189,316	$714,864,140

The growth of China's foreign trade since the opening of the above treaty ports may be seen from the following table:

YEAR	Imports	Exports
1845	$10,277,000	$19,098,000
1875	50,496,000	51,484,000
1885	64,586,000	44,254,000
1890	94,778,000	65,358,000
1895	125,338,000	107,470,000
1896	147,891,000	98,314,000
1899	193,266,000	146,838,000
1900	154,081,000	119,246,000
1901	227,080,000	158,061,000
1905	358,128,000	182,538,000
1910	342,593,100	281,816,000
1911	348,913,000	279,230,000
1912	350,192,000	274,184,000

These figures show the unexampled increase in the trade of China in the year preceding the Boxer uprising, when both the imports and exports more than doubled in value as compared with 1890. The Russo-Japanese War did not have any important effect upon the trade of most parts of China, and commerce is still steadily increasing. As the statistical secretary of the Maritime Customs of China said some years ago, there is no reason why these figures should not treble within a comparatively short time—as soon as railway facilities shall enable the Chinese producer to dispose of his surplus products to the foreign trader. He cannot do this all at once, owing to the extremely high cost of transportation. To quote from the official report: "To form an idea of what future prospects are, it is fair to make a comparison with India. The areas of the two empires are almost identical and their products very similar. But China has a larger, a more industrious, and more intelligent population; while, on the whole, the country is probably more fertile and possesses greater mineral resources. In the former country trade is assisted by good roads, railways, and lightness or absence of taxation; in the latter, at present, it is hampered by directly opposite conditions. The result is that the exports from India are worth three times the exports from China. With equal opportunities, which the building of railways and opening of mines will bring about, the discrepancy should disappear."

As may be gathered from the following table

CHINA'S TRADE BY COUNTRIES, 1912

COUNTRIES	Imports from	Exports to	Total trade with
Great Britain	$55,393,662	$11,765,260	$67,158,700
Hongkong (mostly British products	109,372,740	76,504,160	185,877,640
Japan	67,352,580	40,893,880	108,246,460
Continent of Europe (except Russia)	27,729,280	59,988,840	87,718,120
United States	24,361,199	29,573,732	53,934,931
India	34,518,040	5,604,020	40,122,060
Russia	15,711,680	33,445,780	49,157,460

of the export and import trade with the leading countries in 1912, the closest rivals for the growing trade of China in order of importance are Great Britain, the continent of Europe, Japan, and the United States.

The principal imports and exports in 1912 were as follows:

LEADING IMPORTS AND EXPORTS, 1912

IMPORTS		EXPORTS	
Cotton and cotton goods	$106,625,860	Silk, raw and manufactured	$69,232,180
Metals	13,499,080	Raw cotton	1,259,554
Copper (included in above)	2,630,720	Tin	9,141,220
Railway plant	1,897,360	Hides	8,666,140
Other machinery	3,341,840	Wool	5,078,620
Kerosene oil, America	10,453,980	Hemp	2,360,600
" " Sumatra	5,086,630	Oil	10,471,000
" " Borneo	2,204,460	Matting and straw goods	8,446,360
" " Russia	608,280	Paper	2,405,000
Coal	6,032,480	Tea	2,499,720
Matches	5,168,900	Beans and bean cake	3,049,244
Opium	35,303,180	Sesame	8,854,840
Cigars and cigarettes	6,759,900	Eggs	1,753,800
Sugar	17,823,640	Cattle	2,146,000
Flour	9,393,560		
Fish	7,807,740		

Leading net imports for 1912, expressed in quantity, were as follows: cotton, raw, 279,192 piculs; cigarettes, 4,339,782,000; cigars, 38,638,000; coal, 1,516,801 tons; fish and fishery products, 1,204,893 piculs; hemp, 14,036 piculs; hides (cow and buffalo), 24,569 piculs; leather, unmanufactured, 92,711 piculs; matches, 30,090,020 gross; condensed milk, 387,253 dozen tins; kerosene oil, American, 123,441,777 gallons, Sumatra, 47,345,842 gallons, Borneo, 22,423,644 gallons, Russia, 3,975,648 gallons; flour, 3,202,501 piculs; sugar, all kinds, 4,725,279 piculs. Leading Chinese exports, 1912, in quantity, as follows: silk, raw and unmanufactured, 227,458 piculs; cotton, raw, 805,711 piculs; tea, 1,481,700 piculs; eggs, 291,705,236; beans and bean cake, 19,099,489 piculs; cattle, 77,949; pigs, 266,125; poultry, 2,403,581; hides, dressed and undressed, 7,876,612; tin, 145,227 slabs; sesame, 1,999,761 piculs (1 picul = 133⅓ pounds).

The value of American trade for the last three fiscal years was as follows:

	1910	1911	1912
Imports into U. S.	$29,990,370	$34,227,503	$29,573,732
Exports from U. S.	16,320,612	19,287,836	24,361,199

In silk China furnishes one-third of the world's supply, besides using an enormous quantity for home consumption. Tea is largely exported by land to Russia and Siberia, via Tientsin and Kiachta, and also by caravan through Mongolia. Manchuria is the great bean-producing province and had a good crop in 1912 in spite of the internal situation. Opium again showed an increase in cultivation, because the checks had been removed by the temporary disorganization of the government. On the whole, in spite of the prevailing uncertainty, the year was fairly good in trade. One advantage came in the conversion of much trade from junk to steamer for greater security, and this change will doubtless be permanent. China offers a fair field for all nations, and at present there is not much rivalry in the main for the trade. Japan holds most of the tobacco market, while the United States again has the flour trade, besides a monopoly on dried fruits, but cotton and cotton goods from America seem to be a little too fine in quality and too high in price to suit the average Chinese purse. However, the recently concluded agreement of the Standard Oil Company with the Chinese government for the exploitation of oil in partnership will tend to divert this important commodity into American channels. The prosperity of Manila under American rule has been carefully observed by the Chinese, and the United States could use this to good advantage by making Manila the distributing point for American goods and samples. Chinese trade is capable of enormous increase—in fact, beyond the bounds of imagination; but first the people must be taught to use foreign goods and to acquire a taste or a desire for them. As China's industries are as yet undeveloped, there is no danger of China competing seriously in the world market for the present, and for many years to come the Republic will be dependent upon the great trading nations, Japan, Great Britain, France, Germany, and the United States.

Shipping. The total shipping of the treaty ports, entered and cleared, in 1911, was as follows:

Flag	Tons
British	34,712,440
Japanese	19,172,727
German	6,849,069
French	3,154,157
American	712,161
Total foreign shipping	67,890,431
Chinese	17,881,542
Grand total	85,771,973

The flags sharing most in the Chinese carrying trade in 1911 were the British, with 40.47 per cent of the total; the Japanese, with 22.35 per cent; and the German, with 7.99 per cent. The United States received only 0.83 per cent, whereas in 1906 it had been 1.78 per cent. Since 1905 there has been a steady decline in the percentage of American tonnage. On the other hand, the Japanese increased from 15.01 per cent in 1906 to 22.35 per cent in 1911. The following table shows the Chinese carrying trade during the 10 years beginning with 1902 and ending with 1911:

YEAR	TOTAL SHIPPING		CHINESE SHIPPING	
	No.	Tons	No.	Tons
1902	66,498	53,990,000	26,303*	9,341,000
1903	77,012	57,290,000	30,708	9,111,000
1904	223,835*	63,775,000	146,865	14,768,000
1905	223,959	72,756,000	148,755	16,407,350
1906	208,547	75,819,888	139,304	16,186,750
1907	217,932	80,109,424	147,193	16,686,300
1908	207,605	83,991,289	136,663	16,945,860
1909	208,516	86,771,809	135,053	17,860,810
1910	219,810	88,776,689	146,075	19,597,822
1911	193,398	85,771,973	130,828	17,881,542

* This and the following include Chinese junks and tonnage.

The above figures are all the more remarkable as compared with 1894, when only 38,063 vessels entered and cleared, with 29,622,001 tons.

Government. Recent events in China not only led to the expulsion of the Manchus, but caused a revolution in government as well. While it is true that several old offices and abuses still survive, the Chinese are exhibiting a willingness to discard the customs and traditions of past centuries. Now, for the first time, China is becoming really nationalized.

China has always suggested a confederation of provinces rather than a powerfully centralized government. The vast extent of the country and the lack of communication and transportation facilities naturally led to the provinces and their viceroys and governors assuming much power without interference from Peking. Of course, the Emperor was the autocratic head of all, and his edict or command was law, but with the ordinary routine of affairs the Imperial court rarely interfered. When extraordinary matters arose, the Provincial Governor had the right to petition the Emperor directly. Between the Emperor and the provincial governors was the Viceroy. This office, like that of High Commissioner, gave scope to men of special abilities, and this explains the fact that in recent years foreigners have been familiar with the names only of two or three prominent viceroys. The viceroyalties consisted of two or three provinces, and there were thus 10 or 12 viceroys or

governors-general, who worked together with or independently of the provincial governors. Usually the Governor and the Viceroy were the sole mediums of communication between the capital and province, though the provincial Treasurer and the Provincial Judge were powerful assistants or checks, as the case may have been. Thus these four functionaries constituted the actual government of each province.

Each province had its own army and navy, and in past years may have been uninterested and may have taken no part in wars going on in distant sections of the Empire. Such was the case in the Chino-Japanese War, which was regarded by most Chinese as a personal quarrel of the Manchu court with Japan over Korea. The highest viceroyalty was that of the two Kiangs, with its seat at Nanking; the second was that of Pe-chi-li, with its seat at Peking; the third was that of the two Kwangs, with its headquarters at Canton, the other important capitals being at Fu-chow, Hang-chow, Wu-chang, Chang-sha, Yün-nan, and Ku-yang. The provinces of Shan-tung, Shan-si, and Ho-nan, the oldest parts of China, had no viceroy, while Sze-chuan had no governor, but only a viceroy. Thus each of the 18 provinces, with its own army, navy, and tax system, and its own social customs, was in the past a complete state in itself, whose corporate existence was in no way dependent upon any other state. Only in the regulation of the salt trade, the management of the navy, and occasional "Imperial" appropriations were they under Imperial control. The Peking government made no new laws, left each province to its own devices, and resembled rather the general staff of an army, absorbing and giving out, when necessity called, able men for the administration of affairs.

Although the internal situation of the provinces is changing, the administrative system is still based on the real unit of Chinese corporate life, the *hien*, or city district. Of these there are 1300 in the Republic. Each province has from 70 to 100 or more *hien*, a term which Europeans translate 'district,' 'department,' 'canton,' or 'prefecture.' Thus the half-barbarian Kwei-chow has but 34 *hien*, with numerous districts in which dwell half-civilized natives, while Pe-chi-li has 140 *hien*, the total including the Peking and Mongol districts. The *hien* always consists, in pure Chinese tracts, of a walled city and an area of 500 or 1000 square miles around the town. The *hien* magistrate is the heart and soul of all official life. The people call him "father and mother officer," for he is always close to the masses. Usually entering office with literary or scholastic qualifications only, he is assisted by a permanent staff of trained specialists. He must keep also from 30 to 300 runners, collectors, lictors, and policemen for the administration of justice.

Every group of two or more *hien* is under a *fu*, or city of the first class, and each province has from 5 to 10 *fu*. The ancient customs and privileges of each province, district, and city are still potent in practical politics and make it utterly impossible to give a uniform description of the system of administration, for in reality this federation of states and cities is much on the order of mediæval Germany. The Republic is studded with villages and hamlets, and, as in European nomenclature, many popular names for places are words denoting shop, temple, nunnery, rapids, school, inn, fair, market, bend, etc. The various Chinese districts less than provinces may be likened to the capital, cathedral town, state capital, municipality of the first rank, municipality of the second rank, abbey town, and borough of Europe, differing greatly in territory and population, however, and also in relative historical or commercial importance. But, on the whole, China is a nation of villages, three-fourths of the people dwelling in these. Relatively to the whole population there are fewer large cities in China than in Western lands.

At Peking there was the Emperor as autocrat, assisted by two councils. These were (1) the Grand Secretariat and (2) the Grand Council. The Grand Secretariat was composed of 4 members, 10 learned aids chosen from the Hanlin College, and 200 secretaries. This council deliberated on state affairs and assisted the Emperor in general. The Grand Council, or Imperial Privy Council, was composed of 5 members and 60 secretaries. This one was in recent times the more important, and consulted with the Emperor and prepared edicts for the Imperial signature.

Assisting these two councils were six administrative boards, as follows: 1. Civil Board; had jurisdiction over the mandarin, or official, classes, as to appointing them and regulating their pay, duties, promotion, etc. 2. Board of Revenue; received contributions from the provinces, also selected women for the Imperial harem. 3. Board of Rites; provided for ceremony and feast days, court dress, observances, and etiquette. Governed strictly by the "Book of Rites" (14 vols.). 4. Board of War; never of much importance in past Chinese history, as the "Book of Rites" carefully prescribed the discipline and conduct of the Imperial armies. 5. Board of Punishment; like a court of appeal, a sort of supreme court for deciding capital offenses; also formed the judicial department at Peking. 6. Board of Works; controlled everything in the nature of building, construction, sanitation, repairing highways, etc.

An additional department was created in 1861, as one of the conditions of peace with Great Britain and France. This was the famous Tsung-li Yamen, or Foreign Office, and was closely identified with the Grand Council. In the Peace Protocol of 1901, concluding the Boxer Rebellion, its name was changed to the Wai Wu Pu, now called Waichiaopu, and from then on it took rank before the above six boards. Before 1900, so little did the Chinese regard the importance of foreign affairs that to be ordered to serve on this board was looked upon as a sort of official censure or punishment.

Thus the system of government in old China was largely one of checks and balances, where all divisions were practically free to manage their own affairs, and yet where all coöperated, one with the other, when necessity so demanded.

Since the inauguration of the Republic there have been considerable changes. It is too early to say what the outcome will be, as China is in a state of transition, and some time must elapse before reconstruction assumes a permanent form.

The provisional constitution, adopted March 10, 1912, by the National Council at Nanking, proved impracticable and unworkable. Its greatest defect lay in the inadequate powers it gave to the president, but in other respects it failed to provide for the needs of govern-

ment, and it led to the trouble which arose immediately after the convocation of the first National Parliament at Peking. President Yüan Shï-k'ai found himself seriously hampered by the Kuomintang partisans, some of whom were very sincere, though visionary reformers, and others openly distrustful of Yüan. This party refused to permit the President's message to be read at the opening session and employed obstructive tactics to embarrass Yüan, such as meaningless interpellations, refusal of financial relief, and an attempt to impeach members of the cabinet. Finally Yüan Shï-k'ai's patience gave way, and he issued three mandates dissolving the Kuomintang and unseating its parliamentary members. As this threw out some 300 members, the Parliament was useless as a representative body, and on petition of the Vice President (General Li Yuan-hung), many of the *tutus* (military officers of the provinces), and other high officials, Yüan Shï-k'ai dissolved the Parliament. At the same time he created an administrative council of 71 members and announced that a new parliament really representative of the people would be summoned to meet as soon as the necessary changes could be effected in the constitution. In fulfillment of this promise, on March 18, 1914, a call was issued for a constitutional convention composed of two members from each province, four from Peking, and eight from the territories. This convention met and drew up a workable constitution, with the assistance of foreign advisers, including Dr. Frank J. Goodnow, now president of Johns Hopkins University, formerly professor of administrative law and municipal science at Columbia University, and Dr. N. Ariga, the noted European expert on government.

The new provisional constitution was promulgated May 1, 1914. It contains 68 articles and is believed to meet and overcome all the objections discovered in the document hurriedly adopted by the earlier Nanking Council. It is entitled "The Constitutional Compact of the Chung Hua Min Kuo." The following is an epitome of its provisions:

The first part (Arts. 1–3) is introductory in character. Arts. 4–13 relate to citizens, their equality and rights, freedom of speech, assembly, religion, and petition. Arts. 14–29 refer to the President. He can convoke the Legislature, open, prorogue, and close its sessions. He may initiate legislation and may issue special ordinances in time of need which will have the force of law. He is the head of the army and navy, can declare war and conclude peace, and has extensive treaty-making powers. Arts. 30–38 relate to the Legislature and enumerate its duties. It is composed of one house, chosen by the people. It may impeach the President. Sessions are public and are four months in duration. Members enjoy inviolability for their official acts. Arts. 39–43 refer to administration. Assisting the President are departments of Foreign Affairs, Interior, Finance, War, Navy, Justice, Education, Commerce, and Communications. Arts. 44–48 refer to courts of law, composed of officers appointed by the President. Art. 49 provides for the Council of State. Arts. 50–58 relate to finance. The remaining articles are supplementary in character.

The following plan was adopted (June, 1914) with regard to the provinces: 1. Abolition of the revolutionary *tutuh*. 2. Appointment of governors-general for each province, the Governor-General to be assisted by two lower classes of officials, (*a*) the *tao-yi*, or Prefect, and (*b*) the magistracy.

The Governor-General and his subordinates have direct control over internal provincial affairs, education, and industries. The provincial departments of finance are abolished, also the provincial courts of justice. It is intended that all matters of finance and justice be under the control of the central government.

Formerly the government of China resembled that of a confederation of semiautonomous provinces rather than one with a powerful central authority. The Emperor interfered as little as possible with his viceroys, the latter enjoying almost regal powers in their respective administrations. In the present scheme a radical reorganization is effected, with the purpose of making every part of the country subordinate to the central authority at Peking. Thus many offices heretofore associated with the provinces have been transferred to Peking, or to officials responsible to the Peking government.

The Chinese have never yet had training in popular government of a parliamentary kind, and the absence of definite, well-organized parties makes such popular government difficult at this time. Furthermore, the Chinese need to be educated in the principles of modern republicanism, and, to be successful to any great extent, the whole nation and not only a small portion must take part in the work of rehabilitation. Drawing heavily on what other nations have adopted as the best systems may be the only way at present, but to comprehend the value of these systems is extremely difficult for the majority of the people. In time, no doubt, China will evolve a system of her own based largely on her own peculiar needs. In the meantime the best the Chinese can do is to follow the advice of foreign experts in creating a strong, centralized government and a powerful executive, and then trust to the future for the necessary additions to meet the local situations. In the great changes which are needed for the reorganization of Chinese life, much time and patience will be required for their fulfillment. It is reasonable to suppose that the Chinese, who have for ages followed a fixed routine, will not painlessly adapt themselves even to the better things of a civilization that has been so completely foreign to their nature, training, and environment. For National Colors, see Colored Plate of FLAGS.

Chinese Law. Chinese law is the growth of many centuries and is based on immemorial custom. Though voluminous and complex, it is regulated by the fundamental principle of parental authority which has been the great conserving force and unifying power throughout the ages. The laws are divided into *lut* and *lai*, i.e., fundamental and supplemental—the former permanent, and the latter liable to revision every few years. They may be classified as general, civil, fiscal, military, criminal, and those relating to public works. The criminal code is remarkable for the conciseness and simplicity of its language, yet the actual punishment inflicted depends very much on the judge. In theory the accused is already guilty, and a Chinese judge, like the French, acts as prosecutor as well as arbiter. In spite of the prevalence of bribery, judges are apt to give common-sense decisions,

as public opinion plays a greater rôle in China even than in Western lands, because of the absence of a comprehensive code and statute system. Torture is still used to extract testimony, and punishments inflicted are flogging with the bamboo, banishment, and death by strangling or decapitation. A criminal usually receives short shrift in China. As far back as 1901 the process of mixing Chinese and Western law was begun, to supply what was lacking in the native legislation. Yet China to-day is far behind Japan and the Western Powers in her legal system. This makes it necessary to have foreign courts in China for the protection of foreigners, and to enable them to be judged by their own law. The United States District Court at Shanghai was established in 1906. This system of foreign procedure grafted upon Chinese life, and called extraterritoriality, will necessarily continue until China succeeds, like Japan, in bringing her law up to date in spirit and essence like the law of Europe and America. When China succeeds in doing this, and, with the consent of foreign Powers, abolishes extraterritoriality, she will be a full-fledged member of the family of nations, and not before.

Army and Navy. Until 1895 China had no regular troops in the modern sense. Military forces consisted of the eight Banners (composed of Manchus, Mongols, and Chinese, these Chinese being the descendants of those who aided the Manchus in the conquest of China) and the Green Flag or provincial troops. In the eight Banners were enrolled all descendants of the Manchu forces that had overthrown the Ming dynasty; originally these were a fine body of mediæval soldiery, but they had degenerated into a worthless rabble, living on government rations. As modern soldiers they were entirely useless. They were stationed at Peking and other important towns and were commanded by Tatar generals. The Green Flag army was composed of the forces which each province was supposed to maintain, and these were more like garrisons and constabulary than regular troops. The disastrous War of 1894–95 led to the first attempt to reform the army. Five divisions were raised, but disbanded some years later, except for one division under Yüan Shï-k'ai. A division was composed of about 12,500 soldiers on a peace footing, and in war numbered some 20,000 officers, men, and noncombatants. In 1901 a decree ordered the reorganization of the military, but little was done, except again by Yüan Shï-k'ai, who by 1906 raised six divisions of troops on the modern scale. These formed the basis for the new Chinese army. Then it was planned to form 36 divisions by 1912. Eight divisions were organized by 1907, and by 1912 there were 12 divisions and 19 mixed brigades. Service in the army at present is mainly voluntary. An enlistment of three years is required, and then three years in the First Reserve, where drills are neld one month in a year. From there they pass into the Second Reserve, where there is only one month's drilling in alternate years. After that there is no further liability for military duty. Careful regulations now govern enlistments, and opium smokers and other undesirables are not accepted. Military service is now looked upon with favor as an honorable profession, whereas in past years the soldier was ranked among the lowest in Chinese life—in fact, was treated with contempt. The Revolution and modern China completely overturned that idea. A pension system has been elaborated, and full military education for officers and men, which in recent years has been given mainly by Japanese and German instructors. An attempt is also being made to put the provincial forces on a strict military footing. The division of Imperial Guards, formed in 1908, and originally intended for the royal service, still remains without change in numbers and pay, but is now attached to and controlled by the Republican government. Figures showing the present strength of the army can be approximate only. One estimate placed the number of men under arms, regular and irregular, at the abdication as 800,000. The estimate of the *Luchun*, or national army, and the *Hsun Fang Tui*, provincial forces, in 1911, was given as 517,796, and in 1912 the Chinese army, including all forces, was placed at 428,485.

Under the Manchus each province controlled its navy independently of the Peking government, but now all will be controlled by the Ministry of the Navy. The budget for 1912 estimated naval expenditure at $17,500,000, including pay, manœuvres, balance still owing for shipbuilding abroad ($10,000,000), construction, and arsenals. In 1912 the *personnel* of the navy was about 1000 officers and 4830 men.

The navy is deficient, with no dreadnoughts or first-class battleships. In 1912 the enrollment included 1 second-class cruiser, 3 third-class cruisers, 1 training cruiser, 8 torpedo boats, 16 gunboats, 3 transports, and 2 training ships. Of ships being built there were, in 1912, 5 destroyers, 2 gunboats, 7 river gunboats, 1 training cruiser, and 1 cruiser. Ships not organized, belonging to the various provinces, totaled 19 gunboats, 11 torpedo boats, and 2 transports.

Population. The population of China has never been definitely determined, as no census on the Western plan has ever been taken. In 1912 the customs' estimate, including Manchuria (19,290,000), was placed at 441,983,000. The Mincheng-pu, Chinese census, returns the number in the same year as 331,188,000, to which must be added Chinese Turkestan, 2,491,000; the Manchu military organization, 1,700,000; Tibet, 6,500,000 (some say only 1,500,000); and other dependencies, 760,000; making a grand total of 342,639,000. W. W. Rockhill gave the number in 1904 as 270,000,000; while H. B. Morse believes 385,000,000 the safest estimate for China proper, 16,000,000 for Manchuria, and 10,000,000 for Mongolia, Tibet, etc., making a grand total of 411,000,000. The estimates of the population of Peking vary between 500,000 and 1,650,000. Other large cities are: Siang-Tau 1,000,000, Si-gnan 1,000,000, Tientsin 80,000, Chungking 614,000, Shanghai 651,000, Canton 900,000, Suchow 500,000, Hangchow 594,000, Chang-sha 250,000, Hankow 870,000, Fuchow 624,000, Amoy 114,000, Chinkiang 184,000, Nanking 270,000, Shasi 95,000, Ichang 55,000, Wuhu 98,000, Wen-chow 100,000. If the Chinese should develop their energies by the introduction of scientific farming, mining, engineering, and railways, China proper could easily double its population without endangering its food supply. The following is a list of provinces, with the meanings of their appellations:

PROVINCES	Meaning of name
Pe-chi-li (Chi-li)	Direct Rule
Shan-tung	Mountain East
Shan-si	Mountain West
Ho-nan	River South
Kiang-su	River Su
An-hwei	Peace Glory
Kiang-si	River West
Che-kiang	Che River
Fu-kien	Happiness Established
Hu-peh	Lake North
Hu-nan	Lake South
Shen-si	Shen West
Kan-su	Sweet—Sedate
Sze-chuan	Four Streams
Kuang-tung	Broad East
Kuang-si	Broad West
Kwei-chow	Noble Tract
Yün-nan	Cloudy South

The Chinese abroad are found in every civilized and uncivilized country—there being in the United States, including Hawaii, about 95,000; in the Dutch, British, and American East Indies and French Indo-China, between 5,000,000 and 7,000,000, with many also in Australia, Japan, and Korea; 13,000,000 Chinese are estimated to be in Manchuria and 2,250,000 in Formosa. In 1912 there were in China 2328 commercial houses and 144,754 foreigners.

The following table contains the areas and populations of the provinces, as estimated by the Chinese government in 1911.

Provinces	Areas in square miles	Population (est.) 1911
Pe-chi-li	115,800	20,937,000
Shan-tung	55,970	38,247,900
Shan-si	81,830	12,200,456
Ho-nan	67,940	35,316,800
Kiang-su	38,600	13,980,235
An-hwei	54,810	23,670,314
Kiang-si	69,480	26,532,125
Che-kiang	36,670	11,580,692
Fu-kien	46,320	22,876,540
Hu-peh	71,410	35,280,685
Hu-nan	83,380	22,169,673
Shen-si	75,270	8,450,182
Kan-su	125,450	10,385,376
Sze-chuan	218,480	68,724,890
Kuang-tung	99,970	31,865,251
Kuang-si	77,200	5,142,330
Kwei-chow	67,160	7,650,282
Yün-nan	146,680	12,324,574
Total	1,532,420	407,253,029

Ethnology. In common parlance the term "Chinese" is applied indiscriminately to the general population of Chinese territory. The Chinese proper are the result of a fusion of peoples, few of whom were far removed from one another in speech or in blood, though in the process of conquering the vast territory which they now control, they have received the blood of a number of more primitive races, not all of whom are with certainty to be credited to the Mongolian stock. Chinese literature throws no light on any of the alleged wanderings which some Western scholars have credited the nation to have performed before they settled down in and near the valleys of the Wei-ho and the Yellow River in its lower course. Babylonia, India, Khotan, Siberia, and other parts of Asia have been designated as the original homes of the Chinese, but the several books and papers published on the subject furnish no tenable proofs of any prehistoric wanderings. We have to content ourselves, for the present, with knowing that, according to Chinese tradition, the nation occupied a comparatively small territory about the present city of Si-an-fu. By conquest and amalgamation with the neighboring non-Chinese tribes it extended its territory, chiefly to the east and south. While this expansion was going on, the northwest and north of the country were invaded by a succession of barbaric Sibiric tribes, from which quarter came also the Mongol conquerors of the Chinese in the thirteenth century of our era, and the Manchu dynasty that since 1644 has reigned over the people.

In general the Chinese present the characteristic features of the Mongolian race. The features are square, angular, and flattened, the cheek bones high, the ears usually large and standing out from the head, the chin usually small; the neck short and thickset, and the expression of the face monotonously uniform. The average height is 5 feet 4 inches. The cranial capacity is from 1200 to 1300 cubic centimeters, or about 100 cubic centimeters below the Caucasian average. (For illustration, see Colored Plate accompanying article Asia.) Among the Chinese proper three physical types may perhaps be distinguished: 1. A northern, taller, lighter-skinned, less brachycephalic group. Baelz (1901) considers this type to be "Manchu-Korean" in origin, in part at least, with perhaps proto-Aryan admixture. 2. A central group, which Deniker (1900) thinks has preserved best the original Chinese type. 3. A southern, shorter, darker-skinned, partly brachycephalic and partly mesocephalic type, presenting generally an approximation to the physical type of southern Mongolia, with many suggestions of Malayan admixture. In the opinion of Baelz, the Mongol type prevails in central and southern China, while in the extreme south Malayan influences are very perceptible. Underlying all the non-Chinese admixtures Baelz believes there is an element derived from a quasi-Caucasian race (the Aino of Japan, etc., are perhaps a distant offshoot), once widespread over northeastern Asia, and split in two by the advancing Mongol-Tatar tribes. Zaborowski (1900) holds that the Hakkas (immigrants from northern China into the extreme south), a dolichocephalic Mongolian type, which he considers related to the long-headed element found among the Tunguses and in the tumuli of the Trans-Baikal country, are the real representatives of the ancient Chinese proper. Of the more or less "aboriginal" and non-Chinese people of China the following may be mentioned: the Miao-tzï in the eastern parts of Kui-chou, the south of Hu-nan, northern Kuang-si, and northwestern Kuang-tung; the Lolos (or Nésus) of western Sze-chuan and northeastern Yün-nan; the Tu-jen, Meo, Yao, etc., of Kuang-si; the Shans and other Thaï tribes of the Burmese-Chinese frontier, who belong more or less remotely to the same stock as the Burmese, Siamese, etc. Of these aboriginal peoples the most important are the Miao-tzï, looked upon by many authorities as representing the earlier population of a great part of China and as having a "sub-Caucasian" strain of blood, but considered by others as allied to the Tibetan type. The Lolos appear, by speech at least, to be closer to the Thaï peoples of Farther India. All through the south and west of China the intermingling of peoples has taken place, sometimes on a large scale. The "savages" have not been so nearly exterminated or driven out as some believe.

The most marked mental peculiarity in the Chinaman is the wonderful development of the faculty of memory, without a corresponding exercise of the faculty of judgment. Books are frequently learned by heart and repeated from beginning to end without mistake. The Chinese are persevering and industrious, patient, peaceable, and polite. Their dread of giving offense makes them seem to the foreigner deceitful, often when they are least so. Credulity and sympathy are marked characteristics. As to their morals and religion, the judgments of foreigners are worth very little, for these differ greatly and are so tinged with the personality of the observer that fair conclusions are impossible. With little fear of death, though they politely avoid the subject in conversation or make use of euphemisms, the Chinese resort readily to suicide when in difficulties. In the stolidity with which they undergo torture they resemble the North American Indians. As a rule, they look with contempt upon arms and war, and have always cultivated the arts which maintain peace and harmonious human intercourse, so that for ages China has been practically without an army and without a police force. In one respect China is the freest country in Asia; local self-government has been carried to a very high degree, insuring both personal freedom and excellence in civil organization. The Chinese are lacking, however, in military or naval discipline, and are apt to lose self-control and yield to panic in times of sudden danger. In the main they are temperate, practical to the last degree, unimaginative, imbued with a mercantile spirit, yet literary. Though there are manifold varieties of character and disposition, the inhabitants of China proper are practically one people, notwithstanding that differences in dialect are so great as to make it nearly impossible for the uneducated of distant provinces to understand one another.

The essence of the Chinese social system, which has survived all political changes, assimilating all new elements, and absorbing China's conquerors, is the worship of ancestors, the word "worship" being taken in the old English sense of honor. Filial piety is the first of all virtues. All Chinese worship at the tombs of their parents. In the houses of the well-to-do one room, the domestic sanctuary, is set apart for the tablets inscribed with the names of deceased relatives and ancestors, before which ceremonies, regulated by the classic 'Book of Rites,' are performed. Indeed, China is ruled more from the cemetery than from the Emperor's palace, the care of the dead being often apparently a more important duty than the sustenance of the living. It is always the past that is the Golden age, and reverence for a man or thing is in proportion to age. Much thought is given to the location of graves and cemeteries, this matter, like a myriad of others, being regulated by the *fang-shui* (literally, wind and water), a most elaborate system of superstition, which contains the germs of a rude natural science. To be buried properly is the ambition of every Chinaman; the possession of a handsome coffin is often the most desirable of assets, and frequently this article is a most acceptable present to elders or relatives. The dead are honored by banquets, and in the crises of life ancestors are appealed to for help and direction. In ancient times human sacrifices were made at the graves of the dead. The firecrackers, which are set off in such great numbers at the burial of the dead or in visits to cemeteries, are but substitutes for the figures of men; in the course of time the powder-charged paper has taken the place of the human sacrifice. At the present time these pyrotechnics are supposed to drive away the foul spirits which love to lurk about the haunts of men, and with which the Chinese imagination overpopulates heaven, earth, and air.

Next to death, marriage is the most important event, and is universal, bachelors and old maids in health and mature life being quite unknown. Yet in social life there is a strict separation of the sexes, and the preliminaries of marriage are taken in charge by parents or professional matchmakers called the go-betweens. Often the future bride and groom do not see each other until the woman raises her cap from her covered eyes on the wedding day. Minute regulations direct every step in this and in all other social ceremonies, so that at all times and circumstances the Chinese know just what to do, and even in a house know just where and when to sit down or to stand up. Polygamy is not legal or general, but if the wife proves barren the husband is very apt to take a concubine, for the order of Chinese society requires heirs, and especially sons, to keep up the ancestral sacrifices. The parents have full power over their children, but the duty of administering chastisement is usually left to the wife. Though in times of generous food supply child murder is but little practiced, yet millions of young children die every year; for a sick child when unresponsive to remedies is suspected to be nonhuman and must pass through an ordeal of neglect, cold, or starvation. If it dies, the inference is that it was not human, but either of demoniac origin or else possessed. If it lives, it is human. The Chinese are thus continually under the influence of superstition, which not infrequently bursts out into great disorders, as in the Boxer uprising. In all their intercourse, especially among the higher classes, a tedious and laborious etiquette rules all actions, the Chinese being the slaves of precedent, a circumstance which accounts in part for that lack of mental initiative which is the curse of the nation. Chinese manners were regulated by the code in the *Li-ki*, or 'Book of Rites,' 3000 years ago, and anything that savors of innovation is hooted down as impiety, if not treason. At Peking a department of the government, the Board of Rites, has charge of the interpretation of the *Li-ki* and the direction of ceremonies. The Chinese are therefore prone to think that most Occidentals, though good mechanics, perhaps, are destitute of politeness and morals.

The daily food of the Chinese is for the most part rice with a morsel of fish, pork, or poultry, though millet is much used by the poor in the north. In their cookery, which in the main is wholesome, are some peculiar delicacies, such as soup made from a glutinous substance that is found in birds' nests, sharks' fins, deer sinews, and ducks' tongues. Their drink is brewed from rice and is a mild beer, though distilled liquors from the same grain are very strong. The samshu of southern China and the whisky of Manchuria, with the unextracted fusel oil, make mischievous drunkards. Usually, however, liquor is drunk hot out of tiny cups at mealtime, and tea before or after meals only, in cups that have no saucer or handle, but a cover which

holds the "draw." Out of this cover the Europeans, on introducing tea, made a saucer, adding a handle to the cup. Many festivals and holy days, local, religious, and national, are celebrated, but the greatest of all is New Year's Day, before which debts are paid and new clothing is bought. Congratulations and festivities prevail, for this is every one's birthday, all dating their ages from this day. Though a child be born 24 hours before New Year's Day, it is considered to be in its second year. The Festival of the First Full Moon, the Feast of Lanterns, and the Festival of the Dragon Boat, are the other famous holidays. The streets on such occasions are full of music and gayety, and night is turned into day by myriads of lanterns made of paper and gorgeous with painted scenes in many hues. The Chinese are usually afraid of losing their dignity by active effort, and outdoor sports are not as yet in vogue, unless some utilitarian object is in view, kiteflying and shuttlecock being the most violent in which adults engage; but cards and dominoes, the theatre, gossiping and visiting, story-telling, peep shows and entertainments given by itinerant showmen are very common and much enjoyed. There are hundreds of children's games and sports. Thousands of traveling performers, acrobats, wonder-workers, marionette players, and purveyors of amusements of every sort, including movable refreshment stands and bakeshops, gain a living by amusing the little folks. Nonsense rhymes and comic doggerel for children are chanted by nurses and parents, though for the most part these are as unknown to foreigners as of old the Arabian Nights' Entertainments were to the closest students of Arabic. The Chinese do not shake hands with friends, but join their own hands by way of salutation, and kissing is unknown among them, but prostrations and congratulations are very frequent.

From the standpoint of common sense the Chinese dress is one of the best in the world, varying in material and thickness according to the season; the state of temperature usually takes its name and quality from the number of garments put on. One prominent idea in the theory of Chinese dress is to conceal or minimize the visible distinctions of sex, and only in their headdress and footgear are the women noticeably different in appearance from the men. A loose jacket fitting closely around the neck, and short wide trousers, are the principal garments. Shoes are made of silk or cotton, with thick felt soles, but the upper classes wear boots of satin, into which they thrust their fans or pipes. The mourning color is white. Until their conquest by the Manchus, the Chinese wore their hair like the Koreans, gathered in a knot at the top, and only after much bloodshed were the conquerors able to compel the Chinese to adopt the symbol of subordination and loyalty. Not so very long ago all males without exception shaved the front part of their heads and braided their hair in a long queue. This fashion gave employment to multitudes of barbers, for it is rarely that even a poor man attends to his own hairdressing. For months after the death of an emperor, an event which allowed no one to shave for 100 days, the barbers had difficulty in earning a living. Hot water is preferred both for drinking and washing. After meals the face is wiped with a damp hot cloth. It is thought dangerous in itself to put cold water in the stomach, as it certainly is where drainage is so little attended to. Water to be drunk is first boiled. Unlike the Manchu women, Chinese girls, especially among the upper classes, had their feet bound in early childhood. After the torture of years is over, the lady with "lilies" totters about as best she can, rarely going out of the house, and hearing of the outside world through servants and visitors, her circle of friends contracting rather than enlarging as life goes on.

Many of these habits of life are undergoing a change at present which may do away with a great many time-honored customs. As in Japan, the old Chinese calendar has been exchanged for the Western one. The better-class natives are more and more taking to European styles, queues are no longer worn by officials, including the President of the Republic, and by soldiers; tailors and shoemakers are prepared to work in Western patterns, and that cruel habit of binding the feet of female children is but seldom resorted to, thanks to the agitation of a society initiated by foreign ladies for the special purpose of persuading Chinese families to give up that objectionable custom. Foot binding was not a custom of Manchu families, though, and the late Empress Dowager was one of the first to patronize the anti-foot-binding society. The enormous change now taking place in the social habits of the people is, of course, followed by a great demand for foreign piece goods, hats, shoes, etc., and will cause fluctuations in many branches of the import trade.

For art in China, see CHINESE ART.

Religion. There are five religions in China that are well established. These are the Confucian, Buddhist, Taoist, Mohammedan, and Christian; each of them a "book" religion, and, excepting Taoism, each with an historical founder. The religion of the ancient Chinese consisted of the double worship of God and of ancestors. Confucius gathered up and gave literary form to the national traditions. In doing this he so edited the ancient documents as to throw into shadow the spiritual and to lay emphasis upon the material side of life. By forbidding ambition he cut the taproot of progress and produced a stagnant civilization. His system is still the basis of Chinese society and has a strong influence on the government. It is less a religion than a philosophy and practical code, having reference simply to this life, and making good citizens and neighbors rather than developing the possibilities of mankind. On its philosophical side Confucianism has gone through many changes, until it has become the creed and the substitute for religion with the lettered classes. (See CHU HI.) Though his tablet is saluted, and sacrifices of oxen and sheep are made before it at the equinoxes, it is hardly accurate to say that Confucius is worshiped.

Lau-tzĭ (q.v.)—or, to Latinize it, Laocius—a contemporary of Confucius, though older than he, was more of a true philosopher or inquirer into the causes of things. He taught the doctrine of Tao. His remarkable treatise, the *Tao Teh King* (*tao* means 'reason'), contains neither superstition nor religion, but a system of rationalism. A vast, intangible, impersonal first principle is regarded there as the parent of all things, and man must try to realize this principle by escaping from all distraction. Lao Tses speculations paved the way for introduction of Buddhism. In its subsequent develop-

ment, or degradation, it has become little more than a fantastic system of spirit worship, of which alchemy, incantation, and intercourse with the dead are the chief characteristics. As a religion it is not so ancient as Buddhism, and there is little or no connection between Lau-tzi's teachings and the Taoism of to-day.

Buddhism entered China shortly after the opening of the Christian era, and in its development has taken the Northern, or expanded form, with its paradise, goddess of mercy, scriptures, voluminous and imposing ritual, passionate rhetoric, and a thousand stimulating influences which satisfied a mental craving not provided for in the simple materialism of Confucius. Besides monasteries and images, the Buddhist temples are found all over China, but in decay. The priests are illiterate, and despised by the educated. The monks and nuns are usually beggars, the former recognizable by their yellow robe. Only in a few places can Buddhism be said to be vigorous. The language of the sacred canon is Sanskrit, now known to few in China.

Mohammedanism was introduced directly from Arabia, and, as is believed, by the maternal uncle of Mohammed. Arriving in caravans from Central Asia, or in ships by sea, the missionaries preached the faith industriously, and there are now from 15,000,000 to 20,000,000 Moslems in the Republic. They have obtained state recognition, but their religion marks them as separate from the rest of the Chinese. Yet many of them have attained high positions in the service of the government. Three provinces—Yün-nan, Kan-su, and Shen-si—contain nine-tenths of these believers in one God, there being 10,000,000 north of the Yang-tse-kiang and 200,000 in Peking. Mosques are numerous, each containing a tablet in gold letters and reading "May the Emperor live 10,000 years." There is a large native literature on the subject of the faith of Islam in China.

The progress of Christianity has been slow. A tablet found in 1626, at Changan, Shen-si, indicates that the Nestorians introduced Christianity into China early in the sixth century. The Jesuits Ruggiaro and Ricci went to China in 1579 and 1581. Protestant missions were led by Robert Morrison in 1807. The latest estimates attribute to the Roman Catholics 1,363,697 converts, 49 bishops, 1426 foreign and 701 native priests, and to the Protestants about 325,000. Many of the men in the Reform party have been pupils of the missionaries.

Confucianism has enjoyed state patronage and protection for about 2100 years. There have been severe struggles among the various adherents of "the three religions" for supremacy; but the Chinese mind, indifferent to things abstract, is in its way tolerant, and there is outward peace. Millions of natives, scarcely knowing "the three religions" as separate, accept them in a mechanical unity, each meeting a different want in human nature. Confucianism supplies the need of a moral code, Taoism ministers to the superstitious mind, and Buddhism, with its metaphysics and vague aspirations, appeals to the mystic element in man. There is also a state ritual, with the Temple of Heaven in Peking, at which sacrifices of the first class, to heaven and earth, are made. This leading offering was originally made by the Emperor for his people. With the abdication it was discontinued for a time, but recently Yüan Shï-k'ai again performed the ceremony, to hold the people true to the old standards of morality which had grown somewhat lax during the Revolution. The second class of offerings is to the sun, moon, gods of the land, spirits, and sages, and the third class to deceased statesmen and scholars. On a smaller scale these ritual ceremonies are observed by the magistrates; for, above all, the Chinese in every rank are pantheists. Practically the Chinese are religiously inclined, having deep veneration for the idea of a soul and of immortality. Hence their great respect for the dead, love of funeral ceremonies, readiness to spend money over graves, desire to propitiate the ghosts of ancestors, yearning for sons, the strong family sentiment of unity, and the strict subordination of the younger to the elder. They are tolerant and nonmilitant. Except that there is no day of rest, and that the idea of "praise" never enters the Chinese mind, a good man in China is, in natural religion, very much what a good man is in Christendom. In faith, doctrine, and dogma it is very different, for the average Chinese is uninterested in metaphysics. In the propagation of religion by foreigners true and simple Christianity exercises a lasting effect for good on China. Most of the so-called "religious" troubles come from the clashing of militant alien doctrine with the village customs and social habits so dear to the rustic mind. Towards the questions of liquor, slavery, and concubinage, and in social customs generally, the entire mental attitudes of Europeans and natives still differ to a great extent.

Education. Enormous numbers of the adult population are unable to read or write. The reform of education is one of the greatest subjects now before the Chinese. The government in 1903 appointed a commission of three high officials to study the whole question. The result of its report is that a board of education was established in Peking to decide upon methods of introducing Western education and a school system of different grades. For ages there has been a special literary class who alone knew the literature of their country. Examinations, confined chiefly to moral philosophy and literature, have been held at frequent intervals in the chief cities of each province for the purpose of awarding the degrees that were the necessary passport to positions in the public service. This entire system of literary examinations was abolished by an Imperial decree of Sept. 3, 1905, which introduced a new system by which scholars in the modern scientific schools that are to be introduced will be able to enter the civil or military services.

Practically the only immediate result of the Emperor's attempted reforms in 1898 was the establishment of the Peking University, which to-day is in a flourishing condition. In 1911 there were foreigners engaged with this university and the College of Laws, as follows: 8 professors of science, 5 of law, 6 of engineering, 3 of agriculture, 1 of commerce, and 4 for the preparatory classes at Peking University. A National Education Conference was held, July 11–Aug. 11, 1912, at Peking, at which it was proposed to make the primary grade a four years' course for the ages 7 to 10, and which was to be compulsory. Other grades recommended were the higher primary schools, 3 years' course for ages 11 to 13; the middle schools, 4 years' course for ages 14 to 17; the

preparatory schools for colleges, 3 years' course for ages 18 to 20; and the college and professional institutions, 3 years' course for ages 21 to 24. In addition, three new government universities were proposed, at Nanking, Canton, and Wuchang, to embrace courses in science, law, commerce, medicine, agriculture, and industry.

Great credit is due to the missionaries for having fostered the cause of Western learning in years past, and it is largely the result of their efforts that the old Chinese system is now being abolished. Of foreign colleges in China there are over 35 of Protestant denominations, and also numerous schools and colleges of the Roman Catholic church. The British at Hongkong opened a university March 11, 1912, which is already proving effective. Several of the large American universities are actively engaged in extension work, of which the medical institution at Canton is a conspicuous example

History. The historical period in the development of the Chinese may be said to begin with the Chou dynasty, founded in 1122 B.C., and, on the strength of a number of sacrificial bronze vessels and bells containing hieroglyphic inscriptions ascribed by Chinese critics to the preceding Shang dynasty, we may accept the latter part of that period, falling into the end of the second millennium B.C., as quasi-historical. Unfortunately China cannot boast of any such living witnesses of the high antiquity ascribed to her history by her own literature as the pyramids and the royal tombs of Egypt. It is for this reason a matter of individual choice how far we can trust the literary tradition in its earliest periods. The only unmistakable criterion is the casual mention, with year, month, and day, of an eclipse of the sun, stated in an old poem of the *Book of Odes* to have occurred in 776 B.C., which European astronomers have calculated to have actually occurred and been visible in north China on that very day. This is the reason why some Western critics date the historical period from the eighth century B.C., though Chinese historians give it fully 2000 years more. We cannot blame them for their credulity, if we see what the much too ingenious combinations of the lively imagination of some Western scholars have made of the clearly legendary traditions of Chinese literature. Some of these speculations look for the original home of the race in Babylonia (Terrien de Lacouperie), or in Khotan (Von Richthofen), or in Egypt (De Guignes). In the face of these and other untenable theories Professor Giles's view is the only one dictated by common sense, when he says, "No one knows where the Chinese came from," and he adds, "it appears to be an ethnological axiom that every race must have come from somewhere outside of its own territory." The Chinese themselves have certainly, as far as their literature goes, never assumed that their forefathers 4000 or 5000 years ago were seated anywhere but at what they consider the cradle of their race, the valley of the Wei River and the neighborhood of the present Si-an-fu. There they imagine lived the man whom they considered the first Emperor of their history, Fu-hi (2852 B.C., according to that entirely fictitious chronology). Fu-hi is considered the founder of Chinese social order, to which he raised his people out of a state of chaos characterized by the absence of family life—children knowing their mothers, but not their fathers. The legendary account of this Emperor's life refers to a period of hunting and fishing, whereas his successor, Shen-nung (2737), represents an agricultural period. It is important to note that, although the names of these quasi-historic emperors were not unknown in the literature of the Chou dynasty, most of the deeds ascribed to them must have been invented by later writers. The great historian Ssïma Ts'ién, known as "the Herodotus of China," begins his history with Huang-ti, the 'Yellow Emperor' (2704–2595), to whom most of the elementary inventions of cultural life are ascribed. But the favorite heroes of these most ancient times are Yau and Shun (2357–2206), the model emperors, who stand at the head of Confucius' extract from older records known as the *Shu-king*. In Yau (the Chinese King Alfred) and Shun the Chinese find not only the patterns of regal virtue and the models of all wisdom, but the originators of their civilization and prosperity. These legendary worthies established marts and fairs, drained flooded lands, extended the Empire to the sea, and, in brief, made the golden age of China. Their descendants became degenerate and were supplanted by the Shang dynasty (1766–1154 B.C.), with 28 rulers, most of them vicious and cruel. The feudal system arose under the Chou dynasty (1122–255 B.C.), by which China was governed for 900 years, during which period literature and the fine arts flourished. China was divided into 72 principalities, out of which arose several states whose names and importance, even yet in the twentieth century, exert a potent influence on the internal politics of China. All traces of nomadic life disappeared, agriculture became universal, and great public works were constructed. This is the classical China pictured in ancient poetry and affecting so powerfully the imagination of the modern Chinese. Luxury, misrule, and internecine war, however, brought the nation to deep distress, in the midst of which Confucius was born (551 B.C.). The three great sages, Confucius, Lao-tse, and Mencius, flourished within a century or two of one another. Vice and anarchy were too great to be checked by the wise men; and in 255 B.C. the Chou dynasty came to an end, and was followed by the Ts'in, from which China derives its name.

The Ts'in restored order, abolished the feudal system, drove back the Hun Tatars into the desert, began to build the Great Wall as a symbol both of defense and of United China, and extended the Empire southward of the Yang-tse-kiang valley. To break utterly the power of feudalism, which was popular with the scholars, the Ts'in ruler beheaded hundreds of them and ordered all literature to be destroyed. He was the first Emperor, or Shi-huang-ti. The title "Huang-ti" has been borne since by the emperors of China, and forms the basis of Chinese political orthodoxy and of China's claim to sovereignty over all the nations of the eastern half of Asia. After his death rebellion broke out, and the Han line of rulers (c.206 B.C.–220 A.D.) began. Henceforth no dynasty occupied the throne for so long a period as three centuries, most of them lasting a much shorter time. China's political organization, with its changes and developments (there have been no fewer than 33 dynasties),

compels contrast with the stability of her social system. Under the great Emperor Wu-ti (140–86 B.C.), China began to realize that she was not the only great nation on the Asiatic continent. The Emperor's ambassador Chang K'ien, sent on a diplomatic mission to the West, penetrated as far as the Oxus and Bactria and brought back the descriptions of the great kingdom of western Asia. From this time onward, expeditions to these countries were fitted out, and a lively exchange of products and cultural ideas, including influences in art, followed. From Wu-ti's time dates the trade in Chinese silk overland to Syria and the Roman market. During the time of the Hans the Jews entered China, settling in Ho-nan Province. Buddhism was also introduced about that time. The ancient texts of Confucius were recovered and engraved on stone, ink and paper were introduced, libraries were established, and famous scholars arose. The system of competitive examinations for entrance into the civil service became an institution. The soldiers of China drove the Tatar hordes as far west as Turkestan and added Mongolia to the Empire. The Chinese still proudly call themselves the "sons of Han." The epoch of the three kingdoms (220 to 265 A.D.) was one of war and misrule, but, owing to the adventures of its heroes, was also the romantic period of Chinese literature. During the great T'ang dynasty, one of the longest in the annals of historic China (618–907 A.D.), the Empire extended from the Caspian Sea to the Pacific Ocean, and embassies from Persia, Japan, Korea, Tibet, and various other nations often met at the court of China. Chinese armies won victories on all sides. The Han-lin Yüan ('Forest of Pencils'), or the Imperial Academy (whose library, the largest in China, was burned during the siege of Peking, 1900), was founded. The art of printing by blocks imparted a powerful stimulus to native literary activity in this golden age of literature, when commerce with western Asia, Japan, and the East Indies also flourished. On the fall of the T'ang dynasty, through vice and effeminacy, five feeble dynasties ruled, between 907 and 960. Then the era of the Sung (960–1278) opened, with a fresh burst of literary splendor, and brought in the Augustan age of China, with its amazing activity in bookmaking and printing, and the formation of libraries.

But another great change was impending. Under the leadership of Genghis Khan, the Mongols overran northern China. Under Kublai (1280–94), grandson of Genghis, who established the Mongol dynasty in China, the Empire reached its most splendid development. Kublai's realm extended from the Dnieper in Russia to the Pacific Ocean and from the Arctic Ocean to the Straits of Malacca. The laws were codified, and literature and public works flourished. For a half-century there was considerable commerce with Italy. Marco Polo and his two uncles then lived in the Empire, in the service of the Khan, used paper money and passports, and traveled on the Grand Canal, at a time when paper money, passports, and canals were unknown in Europe. Intercourse with the Arabs and the Persians was continuous, and the highway into Europe was maintained until the Mongols in Central Asia embraced Islam and turned bigots, when communication ceased. The Mongol dynasty, one of the many foreign dynasties of China, ended in 1368, when the throne was occupied by the native Ming or Bright dynasty, noted as patrons of the arts of peace. They cultivated friendly relations with other nations and encouraged Christian missions. Under their rule the Portuguese and Spaniards entered China, Canton became the centre of foreign trade, and Peking, under Ricci, the focus of Roman Christianity.

Modern History. The last Chinese Imperial line, the Ming dynasty (1368–1644), was of low origin, its founder having risen to power in a national reaction which followed the period of disorder due to the disintegration of the Mongol Empire under the successors of Kublai Khan. The first Ming sovereign added Tongking and Cochin China to the Empire. China, however, was continually harassed by the Tatars, and in 1643 the warlike Manchus, besought to defend the country against its enemies, entered it as peaceful conquerors, and a Manchu prince established himself in Peking without serious opposition, beginning the Ta-ts'ing, or 'Great Pure,' dynasty (1644). The enforced adoption by the Chinese of the plaited queue of the Manchus at first produced friction between the races, but this gradually disappeared, and Manchus and Chinese assumed harmonious relations, although the former remained a distinct military and official caste. In most cases the customs of the country and the methods of administration remained Chinese, as did the language, and, like most numerically weak conquerors, the Manchus were assimilated to the ways of the people whom they had subdued. K'ang-hi (1662–1723), the second of the Manchu emperors, was perhaps the greatest of his line. Under him the boundaries of the Empire were extended, notably by the conquest of Tibet; sciences and arts were encouraged, and the great dictionary of the Chinese language and a number of other extensive compilations were begun. His successor, Yung-cheng (1723–36), began the persecution of the Catholic missionaries. These had entered the country following in the footsteps of the Portuguese traders, who had appeared in China as early as 1516, and had been well received at first. The Chinese were never able to comprehend how adherents of the same religion could quarrel as they saw the Jesuits, Franciscans, and Dominicans quarrel, and the missionaries lost credit accordingly. Nor did the Portuguese traders conduct themselves in a way to win the respect of the Chinese, and the avarice, violence, and the spirit of bitter rivalry exhibited by them, as well as by the Spanish, Dutch, and English, all of whom in the seventeenth century followed the Portuguese in the Chinese field, tended to accentuate the suspicion with which the foreigners were regarded. A narrow and exclusive policy, intended to protect China from the aggression of the "barbarians," was initiated before the close of the Ming period, and was developed by the Manchu emperors as time went on. Mutual misunderstandings due to the collision of diametrically opposed civilizations generated continual troubles. Since the liberal days of the Mongol rulers the Chinese had been retiring within themselves, and the admission of foreigners to privileges of trade and intercourse was regarded as a special grace to inferiors. Diplomatic intercourse, in the Western sense, they could not understand, since

the Emperor, the Son of Heaven, had no equals, and those who approached him could do so only as vassals. The Western nations failed to understand this point of view, and Portugal, Spain, Holland, and England tried to enter into permanent relations with the Chinese government, with most humiliating results. Only Russia had any success in dealing with China officially before the first English war. Russia's rapid march across Asia had brought it into contact with China in the sixteenth century, and the first treaty made between China and a Christian Power was that of Nertchinsk with Russia, Sept. 12, 1689, by which the latter's advance on the Amur was checked. The Russians, with their knowledge of Oriental peoples, have always known better than other Europeans how to deal with the Chinese, conceding much to their prejudices in nonessentials, but refusing to acknowledge any inferiority. The United States entered the China field in 1785; and in the palmy days of the old Oriental trade the commerce of the United States was second in volume among the Western nations; but the American government made no attempt to safeguard the interests of its citizens, or to enter into relations with the Chinese government. England began to trade with Canton in 1635, but this amounted to little until 1664.

From 1664 until 1834 England's Chinese trade was in the hands of the East India Company, which the people of the Far East could never learn to regard as a political power. The Chinese government looked upon the representatives of the East India Company in the same way as they regarded the *hong* merchants, i.e., the foreign merchants of Canton—a body without political status, to whom all matters regarding foreign trade had been relegated. The growth of English trade was vigorously fought by the Portuguese, who were first in the field and wished to maintain a monopoly; but the trade and influence of the Portuguese declined rapidly after 1753, until their once prosperous station of Macao hardly paid its own expenses. The growth of European interests in the Far East created an epoch in Chinese history in spite of the spirit of exclusiveness prevailing on the Chinese side. A crisis was precipitated when the monopoly of the East India Company came to an end in 1834, at about the same time when the heavy responsibilities to their own government which the *hong* merchants were compelled to assume had made several of them bankrupt. Trade, which had been regulated by these two corporations, became demoralized, and, under the conditions of mutual distrust and misunderstanding which already existed, trouble was inevitable. The opium traffic, a most important part of Oriental trade, brought existing differences to a head. This traffic had been made illegal by the Chinese government in 1796, but the edicts had never been enforced. Chinese officials connived at the trade, the *hong* merchants found it profitable, and the English government refused to suppress it. In 1837 the Chinese government decided to carry out its decrees, and a governor, Lin, was sent to Canton in 1839 for that purpose. Lin called upon the *hong* merchants and others to surrender the opium in their possession. Elliott, the British superintendent of trade, secured all the opium in the hands of British subjects and turned it over to the Chinese governor; but he refused to sign a bond which would have made all vessels thereafter engaging in the traffic subject to confiscation, and persons connected therewith punishable with death. The reluctance of the British government to interfere with a trade that was worth from $5,000,000 to $8,000,000 annually to the government of British India made all efforts to avoid war unavailing, and hostilities were opened at the beginning of 1840. After the British had captured several ports, taken Ching-kiang in a bloody assault, and threatened Nanking, a treaty was made at the latter city in 1842 by which the five ports, Canton, Amoy, Foochow, Ningpo, and Shanghai, were opened to British trade; a war indemnity of $21,000,000 was exacted; the island of Hongkong was ceded to England; a regular customs tariff was established at the open ports; and in consideration of a transit duty to be levied in addition, goods were given free conveyance to all places in China. The opium question was not touched upon. This first commercial treaty entered into officially by China aroused great interest in Europe and America. An embassy from the United States, headed by Caleb Cushing, negotiated a similar treaty in 1844, and a treaty with France was concluded the same year. British trade grew rapidly after the treaty, the terms of which China persistently sought to evade. In 1856 a Chinese *lorcha*, the *Arrow*, was seized by Chinese officials for alleged piracy, whereupon the owners ran up the English flag and claimed that the *Arrow* was an English boat. Thereupon England's representative in China, Sir John Bowring, made an imperative demand upon China for restitution and an apology to the British government. His demands, though unwarranted by the facts in the case, were all met by China, except that for an apology. This the Chinese officials refused to make, and the complications arising from the incident brought on a new war in the autumn of 1856. France had an old complaint against China for the murder of some missionaries, and joined England in 1857. The war closed temporarily in 1858, with the Treaty of Tientsin. England and France were to have ministers at the Chinese court, at least on special occasions, and China was to be represented at London and Paris. Christianity was to be tolerated in China. A certain measure of freedom of access to Chinese rivers for English and French merchant vessels, and to the interior of China for subjects of the contracting powers, was guaranteed. China was to pay the expenses of the war, and the term "barbarian" was no longer to be applied to Europeans in China. Two years later it became necessary to renew the war to secure a ratification of the treaty by the Imperial government, and this was obtained only when the allied armies held Peking at their mercy. At the time of the conclusion of the Treaty of Tientsin with England and France China signed a treaty with Russia, in which she ceded the Amur territory to that power.

Meanwhile, in 1850, there had broken out in southern China a formidable insurrection, which did not fail to affect the foreign relations of the country. This was the T'ai-p'ing Rebellion, as it was known outside. By the Chinese it was called the "War of the Long-haired Rebels." A schoolmaster named Hung Siu-ts'üan had become possessed of a religious enthusiasm through the writings of some Protestant con-

verts, and had set up a propaganda to overthrow Confucianism and bring China to the worship of the true God. His followers were known as "God worshipers." They soon allied themselves with lawless bands of rebels against the government. Their leader assumed the title of T'ien-wang, or 'Heavenly King,' and established himself as a ruler in Nanking, where he lived a life of cruelty, license, and tyranny. The dynasty which he intended to found was named the P'ing-ch'au, or 'peace dynasty,' which, with the prefix T'ai ('great'), gave the popular foreign name to the rebellion. In the early part of 1853 the rebels had become masters of Wu-chang and Nanking, which latter place became their capital. In 1860 the treaty port of Shanghai was threatened by the T'ai-p'ing, who thus came into collision with the Western powers. A small army, raised at the expense of the Shanghai merchants and maintained by the Imperial government, was created. It was named the Ever-Victorious Army and was organized and led by an American, Ward, who showed great ability, but died before much had been accomplished. His successor, Burgevine, also an American, was promptly dismissed, and the army remained under the command of an Englishman, Holland, until he was defeated at Tai-tsan, Feb. 22, 1863. Li Hung-chang, then Governor-General of the Kiang provinces, applied for an English officer, and Charles George Gordon was authorized to enter the Chinese service. He brought the little army of 3000 or 4000 men to a discipline and steadiness that enabled him to perform wonders with it. At the same time the French forces gave effective aid to the Imperialists. In July, 1864, the Imperialists took Nanking, and the rebellion was practically stamped out, although desultory warfare still continued for a time. Bad faith shown by Li in dealing with the defeated rebels led Gordon to refuse to serve longer in connection with him; he refused all rewards from the Emperor, but completed the overthrow of the rebels. See GORDON, CHARLES GEORGE.

The United States had watched with deep interest the progress of the second Anglo-Chinese War, and President Buchanan sent William B. Reed to follow the course of events, and to mediate on behalf of his government if that should be possible. In its friendly attitude the United States was supported by Russia. The efforts of Mr. Reed resulted in a new treaty between the United States and China, negotiated on June 18, 1858. This was a treaty of amity and commerce under which the United States government guaranteed that no American vessels should engage in contraband trade with China. The United States Minister to China from 1861 to 1867, Anson Burlingame, was so successful in winning the confidence of the Chinese administration, then in progressive hands, that upon his resignation he was asked to head a Chinese embassy accredited to 11 leading nations. In 1868 he set out from Peking at the head of an imposing deputation of the highest Chinese officials, and during the short time before his death in 1869 he did much to bring about friendly relations between China and the Christian Powers. The Burlingame Treaty with the United States supplemented the Reed Treaty in some important respects. Even as late as this China had not recognized the full equality of other nations by admitting their envoys to personal audience with the Emperor, but on June 29, 1873, the Chinese Emperor, under the enlightened influence of Prince Kung and his associates, gave personal audience to the Japanese Ambassador and to the ministers of Russia, the United States, Great Britain, France, and Holland, with the German Secretary as interpreter. The significance of this audience is evident. It represented the final breaking down of Chinese isolation, and the recognition of the Great Powers of Europe as the equals of China. In 1884 France, in attempting to make good her protectorate over Annam (q.v.), became involved in a campaign against the Chinese forces in Tongking. The war was ended in June, 1885, by a treaty giving France control of Tongking and Annam, but leaving open the question of Chinese suzerainty.

In 1894 Japan took advantage of disorders in Korea to revive certain old claims to rights in that country (see JAPAN and KOREA), and sent an expeditionary force into the peninsula. China, which had always claimed suzerainty in Korea, but had allowed Japan to obtain distinct diplomatic advantages in 1876 and 1882, hastened to meet this demonstration, and after minor collisions had taken place Japan declared war, August 1, and on the 26th concluded an offensive and defensive alliance with Korea. On September 16 the Chinese were defeated at Ping-yang, and on the 18th a Chinese fleet was destroyed in a severe naval battle at the mouth of the Yalu River. In November Port Arthur, in the Liao-tung peninsula, China's strongest fortress, was invested, while the main column of the invading army pressed on through Manchuria towards Peking. Prince Kung made an appeal to the Powers for intervention. The United States offered its services as mediator, but they were declined by Japan. Port Arthur was taken on the 21st. The Japanese pushed their operations vigorously, without regard to the approach of winter; defeated the Chinese at Kung-wa-sai, December 19; captured Kai-ping, Jan. 10, 1895; and the strongly fortified port of Wei-hai-wei, in the Shantung peninsula, on February 14. The loss of Wei-hai-wei, together with the remnant of her navy, left China at the mercy of her enemy, with Peking in imminent danger of capture. Li Hung-chang (q.v.) was commissioned to negotiate a peace. By the Treaty of Shimonoseki, April 17, 1895, China recognized the full independence of Korea, ceded to Japan the peninsula of Liao-tung, the island of Formosa, and the Pescadores, and agreed to pay an indemnity of 200,000,000 taels. A new commercial treaty with Japan, much more favorable than that which had been invalidated by the war, was promised. Japan was to retain military occupation of Wei-hai-wei until the commercial treaty was made and the second installment of the indemnity paid, the balance of the latter to be secured by pledging the customs revenue. The collapse of China surprised most of the world, which had been taught to believe that there was tremendous reserve force and power of endurance in this unwieldy but ancient Empire. The revelation of its weakness seemed to be just the opportunity for the great European Powers that were ambitious of influence in the Far East. Russia, France, and Germany promptly protested against the cession of the peninsula of Liao-tung, and brought such pressure to bear that Japan relinquished this part of its conquest.

In the weakened condition of the Chinese gov-

ernment it was more than ever apparent that political influence must go hand in hand with commercial development in China. The embarrassments of the Imperial government resulting from the war afforded an opportunity to the Powers to obtain valuable concessions. Russia in 1895 placed, through France, a loan amounting to $77,200,000, to enable China to meet the payments of the indemnity. In 1896 the sum of $80,000,000 was provided by German and American capitalists, and in 1898 the same amount was advanced by the Hongkong and Shanghai Banking Corporation and the Deutsch-Asiatische Bank. In return for these loans, valuable railway and trading concessions were exacted, with a view to establishing in the decaying Empire spheres of influence which could in any event be guarded against dangerous rivals. In 1897 Germany, by way of reparation for the murder of two German missionaries, seized the port of Tsing-tao (Kiao-chow), on the Shan-tung peninsula, and obtained extensive mining, trading, and railway privileges in the rich Province of Shan-tung. In the early part of 1898, while the British government was endeavoring to secure guarantees that the Yang-tse-kiang region should not be alienated in any way, and that the river should be more freely opened to navigation, Russia obtained a lease of the harbors of Port Arthur and Talien-wan in the Liao-tung peninsula, with railway concessions in the adjacent territory. As an offset, Great Britain obtained Wei-hai-wei for as long a period as Russia should retain Port Arthur.

The danger to China from the foreign Powers now became so evident that two parties appeared, divided upon the method of resistance. One was a nationalist reform party, led by K'ang Yu-wei, a Cantonese, and including Chang Chi-tung, the Viceroy of Hu-peh and Hu-nan; the other a reactionary conservative party, inspired by the Dowager Empress. For a brief period the reformers seemed to have gained control at the palace and held the ear of the young Emperor Kuang-sü. Their wish was to bring China into the ranks of modern nations, along the road which Japan had trod so swiftly and so surely, and to throw off foreign influence by creating a strong and independent Chinese nation. Numerous edicts issued from the palace during the summer of 1898, which seemed to point to the regeneration of China. But against this attempt at reform by proclamation there were the inertia of the most conservative of people, the hatred of all things foreign, and the constant intriguing of the Empress Dowager, a relentless and unscrupulous woman, mother of the late Emperor T'ung-chï and aunt of Kuang-sü, whom she had put upon the throne. Long accustomed to control the affairs of the palace, she kept the weak young Emperor in subjection. In September, 1898, he issued a proclamation practically transferring the sovereign authority to her and confessing himself sick in body and mind. From that time he was lost sight of, and rumors of his death became frequent. A number of the reformers were executed, but K'ang Yu-wei escaped and went into exile. Antiforeign demonstrations in many quarters began almost immediately, and marines were sent to Peking from the foreign naval vessels on the China station to guard the legations. Assaults on the missionaries and destruction of their property became of frequent occurrence, and it was evident that the exactions and dictatorial ways of the foreigners had irritated the Chinese. If the liberal reformers could have had their way, the difficulty might have been peaceably met by creating an orderly, civilized government that would command the respect of the world; but with the triumph of the reactionaries in the government, the spirit that was abroad found vent in violent and barbaric outbreaks that only served further to discredit China with civilized nations. The seizure of full power by the Empress Dowager was marked by the substitution of Manchus for Chinese in the higher offices, which meant the infusion of a more brutal and violent spirit in the government. In January, 1900, the puppet Emperor was heard from once again, in a proclamation made by the orders of the Empress Dowager, naming Pu Chun, son of Tsai Yi, Prince Tuan, as the successor to the throne.

Reports were heard soon after of the activity in Shan-tung of the organization popularly known as the Boxers (a very free translation of the Chinese name meaning 'The Fist of Righteous Harmony'). This organization and another which seems to have become identified with it were apparently the beginnings of a patriotic volunteer militia which was intended for the defense of the country against foreign aggression. It had at the outset the favor of many really well-meaning men, but it soon came into the control of fanatics, whose motto was "Exterminate the foreigners." As reports of its acts began to come in, the foreign ministers made frequent representations to the Tsung-li Yamen, or Board of Foreign Relations, but without obtaining any satisfaction. Matters went from bad to worse, until the very legations in Peking were threatened by the reign of terror which enveloped the capital. A relief force of 2000 marines and sailors from the foreign fleets set out from Taku for Peking, June 10, under the command of Vice Admiral Seymour, the British commander, but this force was unable to reach Peking. On June 11 the Chancellor of the Japanese Legation was murdered in Peking by Chinese soldiers. Already there was little doubt that the Boxer outbreak was encouraged from the palace. On June 17 the allied fleets bombarded and captured the Taku forts. Three days later Baron von Ketteler, the German Ambassador, was murdered in the streets of Peking, on the way to the Tsung-li Yamen. The diplomatic corps, together with their households and guards, before the end of June, were all gathered in the British Legation, which was fortified as well as possible. Cut off from all communication with the outside world, they endured the horrors of a siege for nearly two months. Meanwhile an allied army of relief had been assembled at Taku. It captured Tientsin on July 14 and advanced to the relief of the besieged legations. The march began on August 4, the force numbering about 18,000 men—Japanese, Russian, British, American, and French. Peking was reached and the legations were relieved on the 14th, the Imperial City being taken on the following day. The court escaped into the interior. On the 28th troops of all the nationalities represented (now including some bodies of Germans also) marched through the sacred precincts of the Forbidden City, as a symbol of the humiliation of China.

The advance on Peking and the occupation of Chinese territory were attended with much looting, brutality, and license, not at all creditable to the Christian nations. Li Hung-chang and Prince King (or Ching) were commissioned to treat with the Powers, and after months of wearisome negotiation, prolonged by the differences among the Powers and by the peculiar methods of Oriental diplomacy, a protocol embodying the terms of peace to be imposed upon China was submitted to the Imperial government. This document set forth the expiatory measures imposed upon China on account of the Boxer outrages; forbade the importation of arms and ammunition or the materials for their manufacture; provided for the payment and distribution of an indemnity of 450,000,000 Haikwan taels, or $333,000,000; the conversion of ad valorem into specific duties, and the improvement of the Pei-ho and Whang-pu rivers, at the joint cost of the foreign Powers and China; prohibited Chinese membership in anti-foreign societies under pain of death, and abolished government examinations for five years in cities where foreigners had been massacred; ordered the dismissal of governors who should hereafter permit antiforeign agitation; and transformed the semiofficial Tsung-li Yamen into a Ministry of Foreign Affairs, the Wai Wu Pu, taking precedence of the other ministries. A legation district in Peking which might be fortified and guarded was defined, and certain points were indicated that might be occupied by the foreign Powers to keep communication open between the capital and the sea. In accordance with this protocol, all foreign troops except the legation guards were to be withdrawn in September, 1901, and the status quo was to be reëstablished.

In an Imperial edict issued in February, 1901, China accepted these terms. While the Boxer movement was in progress and the siege of the legations in Peking was going on, the Chinese forces made a vigorous and at first irresistible advance against the Russians in Manchuria, which became the scene of bloody warfare. In July, 1900, the Chinese cannonaded Blagovyeshtchensk, on the Amur River. Russia assembled large forces which finally drove back the enemy, and at the beginning of October Mukden was in Russian hands. During the progress of the peace negotiations the Powers dispatched punitive expeditions in various directions, these operations continuing into the spring of 1901. In June, 1901, Count Waldersee, who had been at the head of the allied forces in China, laid down his command. In January, 1902, the Chinese court returned to Peking. The outcome of the Boxer uprising did not leave the Empress unaffected. The return of the court was followed by the promulgation of various reform edicts placing Western sciences and arts among the courses of study at the Imperial military academy, legalizing intermarriage between Chinese and Manchus, and urging the abandonment of the custom of foot binding. An edict of April, 1903, provided for the establishment of a single monetary standard for the Empire and the erection of a mint at Peking to supply the provinces with a uniform currency. On Sept. 5, 1902, a treaty was concluded with Great Britain providing for the abolition of the *likin*, or internal taxes, as soon as the other Powers should have made like agreements; for the opening of a number of treaty ports; and for the revision of the laws governing mining and internal navigation. Similar treaties were concluded with the United States and Japan, Oct. 8, 1903, and with Portugal, Nov. 11, 1904, but nothing was done by the government to carry its promises into effect, other than the appointment of the progressive Yüan Shï-k'ai (q.v.) as Minister of Commerce with full control over mines, railways, and telegraphs. But, however the Chinese government might be affected by collision with the modern Powers, the national character rendered it seemingly impossible for China to follow the example of Japan in assimilating Western civilization thoroughly and rapidly. The forces of conservatism were as yet too strong, and in consequence the high hopes of speedy reform entertained in some quarters after the Boxer uprising were in large measure destined to remain unrealized.

The question whether the Boxer indemnity should be paid in gold or silver was debated for a number of years. It was settled by an agreement between the government and the Powers on July 2, 1905, making the indemnity a gold debt. During 1905 the last of the foreign troops guarding the line of communications between Peking and Tientsin were practically withdrawn.

Russia, in spite of an agreement entered into April 8, 1902, for the evacuation of Manchuria, made little effort to redeem its promise, and at the beginning of 1904 was still in full control. The war between Japan and Russia followed. (See RUSSO-JAPANESE WAR, where the Manchurian question is treated in detail.) Soon after the outbreak of hostilities the Chinese government issued a proclamation of neutrality (Feb. 12, 1904), and acting under the inspiration of Japan announced the intention of preventing military operations from extending to any part of the Empire but Manchuria. Japan in return disclaimed all desire to acquire any increase of territory at the expense of China. The sympathies of the Chinese people were with Japan, primarily because the defeat of Russia was necessary to the restoration of the integrity of the Empire. In the field of war the Chinese rendered valuable assistance to the Japanese as scouts, while armed bands of the Hungshutz, or Chinese bandits, sometimes under Japanese officers, operated on the western flank of the Russian armies and in Mongolia. The Chinese government made some attempt to obtain representation in the peace conference at Portsmouth in 1905, but without success. The outcome of the negotiations, however, was to its advantage. Russia and Japan pledged themselves to evacuate Manchuria within 18 months and to restore it to the exclusive administration of the Chinese. The two governments, however, were to retain their guards for the protection of their respective sections of the Manchurian Railway. Russia abandoned all claims to territorial advantages or preferential concessions in Manchuria. The transfer by Russia to Japan of the Liao-tung peninsula and the railway from Port Arthur north to Chang-chun was made conditional on the consent of the Chinese government. Such consent was granted in the Treaty of Dec. 22, 1905, between Japan and China, which provided in addition for the opening to trade of 16 principal ports and cities in Manchuria after the evacuation of the country by the forces of the two combatants.

The triumph of the Japanese arms reacted

on the Empire in a twofold manner: it spurred on the throne to an increasingly progressive policy and quickened among the people at large the feeling of national consciousness. Important factors in this development were the large number of Chinese students in Japan and the presence of Japanese teachers, military instructors, and engineers in the various centres of the Empire. The growth of the native press was greatly fostered by the war. Directly this was due to the efforts made by both the Russian and the Japanese government to influence public opinion through the establishment of subsidized vernacular publications, but the general interest in the events of the war also led to a considerable increase in the number of newspapers and a far greater increase in the number of newspaper readers. The influence of the budding "fourth estate" in China was apparent in the boycott movement of 1905 mentioned below. Military progress was conspicuous after 1902. A highly efficient army of more than 50,000 men was developed by the able Yüan Shï-k'ai, Viceroy of Chi-li, as the nucleus of a future army commensurate with the extent and the resources of the Empire. In July, 1905, an Imperial edict ordered the dispatch of four missions abroad for the purpose of studying modern political institutions. One of these visited the United States in January and February, 1906, and a second mission on its way to Europe passed through the country in March. In September, 1905, an Imperial decree ordained the abolition of the old system of literary examinations for office and the institution of a method of selection from the schools of new learning. Parallel with this reforming activity was manifested a tendency to refuse the grant of all further railway or mining concessions to European capital and to reacquire concessions already granted, as in the case of the American concession for the construction of the Canton-Hankow Railway, which was canceled in August, 1905. Partly as a result of general anti-Western feeling and partly in retaliation against the treatment of Chinese in the United States, a boycott of American goods was set on foot in southern China in the summer of 1905 and continued with more or less thoroughness during the year. Probably unconnected with the boycott but attributable to the same state of ill feeling was the murder of five American missionaries by a Chinese mob at Lienchow in October. In December there were serious riots at Shanghai arising from a conflict of authority between the European and the native members of the mixed tribunal. In May, 1906, an Imperial edict placed the entire customs administration of the country, including the Imperial Maritime Customs, which had been managed by Sir Robert Hart since 1863, under two supreme native administrators to whom the Inspector General was made subordinate. The Powers united in opposing the terms of the edict, but with some modifications and guaranties it remained in effect. It was believed that the Chinese government intended to make use of the revenue funds in the upbuilding of the army.

Among the many reforms planned and completed as the result of the Russo-Japanese War, none was perhaps, for practical reasons, more important than the strengthening of China's defensive power. In 1907 Yüan Shï-k'ai and Chang Chï-tung, the viceroys of Chi-li and Hukuang respectively, were appointed to memberships of the Grand Council, in which capacity they pushed matters considerably towards reshaping the Chinese government on the lines of modern progress. To Yüan Shï-k'ai, the experienced creator of foreign drilled troops, fell the rôle of reorganizing the army, besides that of furthering advanced views in education and improvements in the civil service, and Chang Chï-tung was not slow to follow as far as his provinces were concerned. A centralization of military forces was aimed at by weakening as much as possible the control of provincial authorities and placing the military reins in the hands of metropolitan chiefs. Naval reforms followed more slowly, but the promises for liberal changes in the Imperial government were but partially and very reluctantly complied with, although many important changes had taken place. The much-longed-for convocation of a national parliament was in 1907 deferred to a distant future. An agitation, fostered by the Imperial government as well as by patriotic circles among the population, for suppressing the opium vice was one of the great reforms following an Imperial edict issued in September, 1906, according to which all opium smoking was to cease within 10 years, and steps towards the gradual extinction of the vice were taken by the Chinese government with the coöperation of Great Britain, the government of India promising to decrease the importation of the drug at certain rates per annum, and opium dens being closed in Hongkong. Many of the reforms suggested by K'ang Yu-wei and suppressed by the coup d'état of 1898 were now carried out, chief among which was the abolishment of the so-called wen-ch'ang system of civil-service examination. The celebrated examination halls were now devoted to other purposes; temples and public halls were changed into schools where foreign sciences were taught by native and foreign teachers. Among the latter many Japanese were engaged, and Chinese students were sent to Japan, the United States, and Europe. The United States had an important share in the education of young Chinese, and the very best class of students were sent to American schools and universities, because, unlike the other belligerents, America had remitted to China the indemnity due from the Boxer War in 1900 so that large sums could be appropriated for purposes of education in the United States. It is quite possible that the fact of so many of the best students having picked up their first lessons in constitutional law, political economy, education, etc., in republican surroundings has helped to pave the way towards the great change in China from the most absolute monarchy to a republic.

The prelude to this great change may be seen in the sudden deaths of both the Emperor Kuang-sü and the Empress Dowager Tz'ï-hi in November, 1908. Kuang-sü's successor was the infant son of the Emperor's brother, Prince Chun. He reigned under the style Süan-t'ung with his father as regent, whose liberal inclinations certainly were no impediment in the progress of reforms. In 1909 provincial assemblies were called in, and a Senate was formed in 1910, and several new railway lines were completed and opened to traffic. But, though the Imperial government was now free from committing such crimes as had marked former generations, the foundation had been laid

for changes which nobody at the time dared to foresee. If we review the several factions then at work in China according to the views of their leaders, we may make the following distinctions. There was, in the first instance, the Manchu conservative, or reactionary, party, counterbalanced by the liberal adherents to the Manchu government. K'ang Yu-wei and Liang K'i-chou, the reform philosophers of 1898, were by no means opposed to the Manchu dynasty, as has been occasionally assumed. Their programme was in favor of a constitutional monarchy under a Manchu emperor, with the exclusion of the Empress Dowager Tz'ĭ-hi, and after her death they looked upon the young Emperor Süan-t'ung with his liberally inclined uncle, the regent Prince Chun, as the power that would carry out their ideas in the future. A comrade as it were in his wish for liberal government in China and a fellow victim of the persecution of the late Empress Dowager, though with widely different aims before him, was Dr. Sun Yat-sen, a native of the Kuang-tung Province, educated in Honolulu and Hong-kong, where he studied medicine under Sir Patrick Manson's successor, Dr. Cantlie. His patriotism, coupled with the impressions he had received from his education in a quasi-foreign atmosphere, led him to conceive the plan of organizing among his countrymen a revolution against the Manchu dynasty. In this, in spite of many reverses and after years of patient perseverance, he succeeded. In 1896, while on a visit to the United States and England, he issued a manifesto calling upon the people to rise against their oppressors, the Manchu government. An attempt to make him a prisoner at the Chinese Legation in London had failed through the interference of the British government, and for a number of years he traveled abroad as one of the most indefatigable and finally successful agitators the cause of liberty has ever seen. The attempt at an insurrection made on the frontier of Tongking in 1907 had failed; but the fruit of his great work was to ripen in the summer of 1911. A railway strike in Sze-chuan, caused by the introduction of foreign capital and material, had resulted in the sending of Imperial troops from Wuchang, and this furnished the ground for a general rising against the Manchus. This rising spread from province to province, the people of which soon found themselves to be one in the cry for a change in government. The ground had been well prepared, and when, in the face of too many reverses the Imperial troops had suffered in various parts of the Empire, the court seemed prepared to yield to the demands of public opinion, it was too late even for Yüan Shĭ-k'ai, who had been recalled from his voluntary retreat and appointed Prime Minister in November, 1911, to save the dynasty. The revolutionary committee, which had been joined by the former envoy to the United States, Wu Ting-fang, had invited Yüan Shĭ-k'ai to become the head of a Chinese republic, the establishment of which seemed to be unavoidable, but the Premier may have thought his opportunity had not come yet; but on December 28 the Imperial family left the capital, placing the decision as to the form of government, whether monarchy or republic, in the hands of the people in its National Assembly. The result was that Dr. Sun Yat-sen, the spiritual father of the republican idea, was elected the first President of the Chinese Republic under a provisional constitution. In the meantime weeks elapsed until the court could be got to acknowledge the course of events by the abdication of the Emperor Süan-t'ung, which was formally announced on Feb. 7, 1912. The Manchu dynasty had reigned in China since 1644. In an edict of February 12 the young Emperor's mother, who had become regent after the retirement of Prince Ch'ung, bowed to the will of the people in declaring that the wishes of so many millions should take precedence over the interests of one, the Imperial, family, and Yüan Shĭ-k'ai was appointed to coöperate with the provisional government at Nanking. Sun Yat-sen, who would have liked to declare this city to be the capital, invited Yüan Shĭ-k'ai to join him there; but too many reasons now favored the retention of Peking as the seat of metropolitan government, and he preferred to remain there. The members of the Imperial family were most generously treated on their retirement, owing to the insistence of Yüan Shĭ-k'ai in obtaining honorable terms for them. When Dr. Sun Yat-sen, having fulfilled his great mission, resigned as President, Yüan Shĭ-k'ai saw himself in possession of the highest power as the second President of the Chinese Republic. His position was not an easy one, but he had, over all the possible candidates for the position he held, the great advantage of being the strongest leader from a military point of view, and the several acts of his government seem to show that he is willing and able to wield his power with a strong hand. Dr. Sun Yat-sen's views did not agree with what seemed to him high-handed proceedings of the new chief, and the arrest and the execution of two generals suspected of secretly supporting a counter revolution, which actually broke out and led to a number of encounters in several parts of the country, increased the opposition in the ranks of malcontents. It is a matter of course that in such a new organism, when changes of the most radical order take place in all departments of public life, things cannot run so smoothly as one might wish. The several political parties threaten to clash on every possible occasion—the liberal party of the south, with the adherents of Sun Yat-sen, demanding government by the people through its representatives in the National Assembly and claiming immediate influence on the decisions of the President; the latter wishing to keep his hands free and preferring to reign without a parliament rather than be hampered by systematic opposition. The new Parliament, opened on April 8, 1913, was dissolved within less than a year. Missionaries had placed great hopes on a decision adopted by the cabinet calling upon all churches to pray for the welfare of the Republic, and the response made to it even from the pulpits of the United States looked like a good omen for the progress of Christianity in China. Yüan Shĭ-k'ai himself said: "I am unequivocally a Confucianist, but nothing but Christian ethics can save China." For national coat of arms, see Colored Plate in article HERALDRY.

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CHINA and **CHINAWARE.** See POTTERY.

CHINA (kī'nȧ *or* kē'nȧ) **BARK.** See CINCHONA.

CHINA CINNAMON. See CASSIA.

CHINA CLAY. See CLAY; KAOLIN.

CHINA GRASS, or **CHINESE GRASS.** The popular name of a fibre used in China for the manufacture of a beautiful fabric known as grass cloth. The name appears to have originated in the belief that the fibre was that of a grass; but this is not the case, it being obtained from *Bœhmeria nivea*, a plant allied to the nettle. Grass cloth is now brought in considerable quantity to stores, especially in the form of handkerchiefs and other textiles. It has a fine glossy appearance and a peculiar transparency. See BŒHMERIA; RAMIE.

CHINA INK. Another name for India ink (q.v.).

CHINANDEGA, chē'nän-dā'gȧ. A town of Nicaragua, situated 25 miles northwest of León and connected with the Pacific coast by railroad (Map: Central America, D 4). It is the capital of a department of the same name, is the centre of a corn district, and has considerable trade. Pop., 12,000. In this town was formulated in 1849 the celebrated Chinandega Agreement, an unsuccessful attempt to form a strong federation of the Central American States. San Salvador, Honduras, and Nicaragua drew up the agreement. Later Costa Rica adopted it, with certain specific limitations; but Guatemala rejected it with indignation.

CHINA SEA, or SOUTH SEA. A partially inclosed sea, lying off the southeast coast of Asia (Map: Asia, L 7). It is bounded by China and Formosa on the north, where it connects by the Strait of Formosa with the Eastern Sea; by French Indo-China, Siam, and the Malay Peninsula on the west; and by the island loop of Borneo and the Philippines on the south and east. On its west border are the indentations occupied by the Gulf of Siam and the Gulf of Tongking, the latter being partly shut off by the island of Hainan. The sea increases in depth from south to north; soundings of more than 13,000 feet have been made off Luzon, but much of the southern portion has a depth of less than 1000 feet. Typhoons of great violence endanger navigation during certain seasons. The chief ports on the China Sea, or close to it, are Manila, Singapore, Bangkok, Saigon, Canton, and Hongkong. The largest rivers draining into it are the Mekong, Menam, and the Si-kiang, or West River. With the exception of Hainan, there are no large islands.

CHINA TREE, PRIDE OF INDIA, or PERSIAN LILAC (*Melia azedarach*). A handsome tree, a native of India and Persia, and the type of the family Meliaceæ. The tree is widely distributed throughout the warmer portions of the globe. It grows to a height of 30 or 40 feet, and has bright-green compound leaves and fragrant lilac flowers. It resists drought and is highly thought of as a shade tree in regions adapted to its requirements. It will withstand considerable cold, but cannot be recommended for regions where freezes are frequent. The abundant lilac-colored flowers appear early in the spring, and the leaves are retained late into autumn, followed by the clusters of yellowish berries, making the tree attractive at all seasons of the year. The wood is rather coarse, but durable and handsomely marked, making it valuable for cabinet use. The leaves, flowers, and berries are reputed to have medicinal properties, although not recognized in some pharmacopœias. In Australia the tree is known as white cedar, and its uses are numerous. A number of forms of China trees are common in cultivation, one of the most handsome being that known as the Texas umbrella tree. Its spreading habit and dense foliage make it one of the most desirable shade trees known.

CHINA WAX. The secretion of an insect (*Coccus*) which lives on the ash trees of China. See WAX.

CHINCHA ISLANDS, *Sp. pron.* chēn'chȧ. A group of three small islands in the Pacific, near lat. 13° 40′ S. and long. 76° 30′ W., 12 miles from the coast of Peru (Map: Peru, B 6). The area of the entire group is only about 4000 acres. The surface is rocky and devoid of vegetation. The islands were of some importance formerly, due to immense guano deposits which began to be exported by the government in 1840 and were exhausted by 1874.

CHINCH BUG (from Sp., Portug. *chinche*, It. *cimice*, from Lat. *cimex*, bug, and Eng. *bug*). A small blackish bug (*Blissus leucopterus*), with white wing covers marked with a 6-shaped dark line. It belongs to the Lygæidæ, one of the most extensive and injurious families of plant bugs, of which some 175 species belong to North America. The chinch bug is spread all over the United States and throughout Central America and the West Indies, and is the most destructive bug, and probably the most destructive insect, in the country, especially in the Mississippi valley. It appears in incalculable numbers in dry seasons, and the Department of Agriculture places the average annual damage at $20,000,000. The adults live through the winter in old grass and rubbish. Early in the spring the female lays 500 or more eggs on the roots and stems of grain. The young, at first, are red in color, and, clustering in crowds on the stems and leaves

of grain or maize, suck out the juices and kill the plants. Wheat suffers most. There are two generations in a year. When arriving at maturity, the broods scatter, and should a strong wind be blowing at the time the insects are on the wing, they may be blown or carried many miles. Wet and cold springs and severe winters help to keep down the number of this pest. In Kansas several contagious diseases that attack this bug have been discovered, and to facilitate the spread of such diseases infested chinch bugs are sent to various parts of the State with alleged encouraging results. Several illustrated monographs of this species have been issued, of which the most complete is that by F. M. Webster, *The Chinch Bug* (Department of Agriculture, Washington, 1898).

CHINCHILLA, chĭn-chĭl'lȧ (Sp., from So. Amer. Indian). A small South American rodent allied to the cavies, but outwardly much resembling a ground squirrel, which represents an extensive family (Chinchillidæ). All the species are gregarious, feed much on roots, for which their strong and sharp incisors are particularly adapted, and live either in holes, which they select for themselves in rocky districts, or in burrows, which they excavate. They are valued for their fur, particularly the chinchilla of the Andes (*Chinchilla lanigera*), whose mouse-gray and extremely soft and lustrous fur constitutes an important article of commerce; but their numbers are said to be perceptibly decreasing. The ancient Peruvians were accustomed to employ the wool of the chinchilla for the manufacture of fine fabrics. See Plate of CAVIES.

CHINCHILLA DE MONTE-ARAGÓN, chĕn-chē'lyȧ dȧ mōn'tȧ ȧ'rȧ-gōn'. A town of Spain, in the Province of Albacete, 10 miles southeast of the city of that name (Map: Spain, E 3). It is surrounded by walls and has a castle. Previous to the nineteenth century Chinchilla was considered the most important city in the territory of what is now called the Province of Albacete. It has manufactures of cloth, linen, leather, earthenware, and glass, and a trade in the agricultural produce of the district. Pop., 1900, 6544; 1910, 6795.

CHINDWARA, chĭnd-wȧ'rȧ. The capital of a district of the same name in the Nerbudda Division, Central Provinces, British India (Map: India, C 4). It is situated in lat. 23° 4′ N. and long. 78° 57′ E., on the Satpura plateau amid the Deoghur Mountains, 2200 feet above sea level. Its climate is agreeable and salubrious and attracts many visitors in search of health or recreation. The city contains an English school, an Arabic private school, and two dispensaries. Area of district, 4631 square miles. Pop. of town, 1901, 4216; 1911, 3404; of district, 1901, 407,865; 1911, 516,948.

CHINESE ARROWROOT. See NELUMBO.

CHINESE ART. Until recently very little was known of Chinese art. But the publications of the Japanese, with their admirable reproductions in color, the looting of the Imperial treasures at the sack of Peking, and the recent political events, culminating in the real opening of China to the western world—these and other factors have not only thrown light upon the development of Chinese art, but have enabled us to study it from the originals. The recent expeditions sent by the various European governments, especially the German and British to the Kingdom of Khotan on the northwestern Chinese frontier, have thrown much light upon its origins. Chinese art is a homogeneous and continuous development, the beginnings of which rival the Egyptian and Babylonian in antiquity, and its development has continued into our own day. China occupies the same important and influential position in the art of the Far East, with its endless ramifications, as Greece in the Occident. The art of China began to be important in the third millennium before Christ, attained an important development under the Shang dynasty (1766–1154), a second in the Chow (1122–255); a third and stronger creative effort with the Han dynasty in the second century B.C.; its culmination in the T'ang period (618–907 A.D.) and the Sung (960–1280). It continued to flourish under the Mongol conquerors (1280–1368), experienced a renaissance under the Ming dynasty (1368–1644), and continued, though with less originality and force, under the Manchus to our own day. Although a highly national and characteristic development, it was repeatedly influenced by external forces. It seems to have felt the remote influence of the Mycenæan style and was certainly affected by the Scythian and by the mixed style of Central Asia. China was not unaffected by the Hellenic culture of the Eastern Empire, with which it had commercial relations. The most powerful external influence, however, and the chief factor in the development of Chinese art, followed the adoption of Buddhism. A modified form of the Greco-Indian art, starting from its home in Gandhara (northern India), progressed triumphantly through Central Asia and entered by way of Khotan into China during the third and fourth centuries A.D.

Painting. The origin of painting, which is the most important development of Chinese art, is found in calligraphy. For Chinese script is written with the brush and requires highly artistic execution. Only fluid colors are used on highly absorbent materials, such as silk or paper, upon which no change or retouching is possible. Unlike Occidental painting, Chinese is essentially romantic rather than naturalistic in character. Its purpose is not to represent facts, but to suggest a poetic idea. Although exquisite in color, its chief beauty is one of line. It is decorative in character, avoiding modeling and shadows. The Chinese painter must conform to certain conventional schemes, which are themselves admirable syntheses of the chief structural formations in nature, but is unrestricted in the expression of feeling. As early as the third century B.C. there was in China a highly developed painting, secular in character and devoted chiefly to history and portraiture. Paintings were then made on wooden panels and on walls prepared with line, as well as on silk and paper. In the second century we hear of the beginnings of landscape. The T'ang period (618–907 A.D.), under the influence of Buddhism, was the age of classic figure painting, with Buddha and the sages as principal subjects. The human figure was decoratively conceived, not naturistically, but with wonderful power of expression. The chief characteristic of Buddhist painting was a grand rhythm of line and arrangement; the colors were bright and harmonious. Wu Taotsü, universally conceded the greatest of all Chinese painters, flourished during the period. A painting in the Freer collection (Detroit), attributed with some probability to him, affords an excellent idea of his style. This age saw the further

development of landscape painting in two great schools—the southern, which was romantic and literary in character, and the more naturalistic northern. At the head of the former was Wu Wang Wei, of the latter Li Ssühsün. The golden age of painting was under the Sung dynasty (960–1280) which saw the culmination of the landscape. Like the painters of Barbizon, 1000 years later, the Chinese depicted all the moods of nature with the most intimate charm and with a power of suggestion never after equaled. Their theme, however, was the spirit of nature rather than its actual appearance. Particularly delightful are the paper scrolls upon which whole series of landscapes are painted. The solitary figures of hermits or sages in the landscape serve to accentuate the emotional quality. Among the greatest landscape painters of the epoch was the Emperor Hwei-tsung. ' There were animal as well as landscape painters; and every object of nature, animate or inanimate, was depicted with impartial love and skill. The Mongol (Yuen) dynasty continued the established manner, but with a certain petty realism. Genre, flowers, birds, and insects were favorite subjects. The early Ming period (till c.1500) attempted a renaissance of Sung painting, but with emphasis of the accidental rather than the typical, but afterward followed rather the Yuen style. Elegance replaced simplicity, yet such painters as Lin Lang are worthy of comparison with those of the great age. Pictures of court life with brilliant color effects were favorite subjects. Under the Manchus art petrified. Technical ability remained, but this was chiefly an age of copies. Still, much good painting was produced, even to the present time. One of the most characteristic forms of Chinese painting is the ink sketches of the Sung and later periods, which are marvels of vigorous and delicate executions. The finest collection of Chinese painting in the western world is probably that lately acquired in China by Charles L. Freer, which will pass after his death to the National Museum in Washington. Other important collections are those in the British Museum, and the Musée Guimée of Paris, the Metropolitan Museum of New York (q.v.), and the Boston Museum.

Architecture. Architecture in the usual sense is not known to have been carried to important results in China before the appearance there of the Buddhist influence in the course of the first century A.D. Then Indian types were introduced, and the Taa, or pagoda, of Chinese form appeared; although none of such early date has been identified. These towers, as they now exist, are usually constructed of brick, which material is concealed in many cases by an elaborate facing of what are spoken of as "tiles," but which are frequently very massive and of elaborate form, embossed with sculptured designs very richly painted. Others exist, which are built chiefly of stone. Some reach the height of 13 stories, but this seems to be unusual.

The roof is far more prominent in Chinese architecture than in that of Europe; and the roofs must have been always of wood, as they are to this day; round logs of no great size, or lengths of bamboo. The curious and often noted tentlike form of these roofs with hollow curves, the steep pitch of the upper part, growing less and less until the broad eaves are almost horizontal, are not to be ascribed to any attempted imitation of the actual tent of canvas or textile material. They are unquestionably the result of the peculiar framing of the roof, which, whether built of hollow bamboos or of light solid pieces, whether squared or preserving the natural form of the log, is constructed in a way altogether different from that used in the roof building of Europe. The artistic importance of these roofs, their value, individually or in groups, and their novelty to Europeans, have led to a hasty assumption that Chinese architecture takes its forms and its design mainly from original timber building. Of this, however, there is no evidence; bricks are known to have been used in great abundance in China at an epoch long before the commencement of our era, and skill in handling granite and stratified stone is traditional. Wood must have been common, from an antiquity comparable to that of the buildings of Chaldæa.

As to the general plan of buildings, it is evident that from the beginning until the present time the Chinese idea of a residence has been nearly that which the peoples of the Mediterranean held during the years of classical antiquity; and that the Chinese palace and temple have been what those of the Mediterranean world were until the time came for competition between towns and states in the way of more striking and more permanent structures. A Chinaman's house, if he is a rich man, is a group of small one-story buildings interspersed with gardens, all within a bounding wall. Precisely the same tendency is visible in the temples of China, the "pagodas" or tower-like structures of whatever form being decorative and symbolical accessories, like the church steeple in a village of low wooden houses in America. In such low buildings the roof is, of course, the most visible and striking feature, and the fact that the forms of this roof interested the builders and became the dominating element in their design, even in the towers, is in no way surprising. We see this in full glory in Japan down to an epoch now scarcely closed. (See JAPANESE ART.) The construction is unlike that of Europe, inasmuch as it ignores diagonal bracing and substitutes for it a steplike series of vertical struts and horizontal ties. Thus, if we have to carry a pair of sloping rafters, these rafters are, in Europe, secured at the top of the wall and again where the two rafters meet at the ridge; but the Chinaman supports each rafter at four, five, or six points in its length, and thus prevents it from having any tendency to push sidewise. The purlins, or long horizontal pieces which carry the light outer rafters and the roof coverings are supported in Europe by the main rafters of the truss (see ROOF), but in the East on the successive steps resulting from the square-framed structure. The scientific construction of Europe is so entirely identified with the triangle (see ROOF; TRUSS) that we can hardly imagine wooden architecture which ignores it; and yet such buildings in China and Japan have been found to last 1000 years in perfect condition.

The monumental gateways of China have always been admired by Europeans. The term *pai-loo* is applied to these, although some writers use that term for such a gateway when having several divisions, and *pai-long* when there is but one opening or passage. The pai-loo on the road leading to the tomb of the Ming emperors is of marble and has five openings; another, at the

entrance of the Chun-Tsiang-Cha, has three round arches, and the one called the Porcelain Gate has three pointed arches—all these being in Peking. There is a great pai-loo of granite in the city of Ning-po, and several in the southern provinces are elaborately worked in marble. These gateways are frequently set up as memorials, approved by the sovereign as deserved by one of his subjects.

Although public buildings are very commonly devoid of great massiveness and of that kind of dignity which comes of ponderous and enduring structure, this is replaced very largely by elaborate surface decoration. For this purpose the unequaled skill of the Chinese in all forms of ceramic art, their great power as decorative sculptors in wood and stone, and the knowledge and taste they show in painting in permanent colors by a method which we call roughly "lacquering"—though in reality lac does not enter into it—give their permanent decoration great value. Wooden screens and partitions, verandas and garden houses, receive exquisite adornment in modeled and colored patterns, the use of textile fabrics and enameled tiles.

Sculpture. Carving in stone was practiced in China during the earliest periods, but the first real impulse towards a monumental sculpture came with Buddhism. Temples, similar to those in India, were adorned with rock-cut images of Buddha and his disciples, carved in the Greco-Indian manner. A typical example of such a temple with a multitude of carvings is at Tatong (Shansi) dating from the fifth century, and there are a number of others. Colossal Buddhas of stone were characteristic of the T'ang period. Owing to the inability to represent the human figure, except in a conventional fashion, the Chinese never produced anything comparable to the sculpture of Western lands, excepting in decorative work. On the whole, sculpture in China is identified with movable pieces of decorative effect more than with architectural enrichment or with close representation of nature. Wood carving and elaborately wrought modeling in clay, which is afterward fired, and the surfaces painted and glazed, are carried to a refinement unknown in Europe. The carving of hard stones, like jade and rock crystal, and soft stones like opaque, veined talc and steatite, and of ivory, is an art especially identified with China. Jade carvings are of great elaboration, as where a single piece containing .250 cubic inches is wrought into two complete vases, side by side and separated from one another, except as leaves and twigs, all cut out of the solid mass, connect them.

Bronzes. In the modeling and casting of bronzes, especially those of a decorative character, the Chinese are unexcelled. The development of the art has lasted uninterruptedly for a period of 3000 years. The products are for the most part images and utensils used in the temple services, such as vessels for offerings, vases for wine, flowers and many other purposes, bells, drums, as well as objects of a similar character intended for secular use. These bronzes have been preserved in such numbers that it is possible to form an adequate idea of the development of the art. Pieces of temple furniture exist as early as the Shang and especially the Chow (1122–255) dynasties. They are severe and grandiose in form, to which the rich ornament is strictly subordinated. During the Han period conventionalized decorative images of human, animal, and plant life are used in decoration, and Hellenistic methods appear. The T'ang style unites more realistic conceptions with a more suave execution, and prefers curved linear form. This character was further developed during the Sung period, in which the effect is gained more through quality of surfaces and purity of form than through detailed execution. This was also the period of some of the finest inlaid work, in which gold, silver, and semiprecious stones were used, a technique in which the Chinese especially excelled. Artists of the Ming period, on the other hand, emphasize a richly decorative detail, sometimes to the neglect of the general effect. Ancient forms were reproduced with remarkable technical skill, but with an added elegance which somewhat impaired their purity. The same remarkable technical ability continued throughout the Manchu period to the present day, but with too much emphasis upon detail and decoration.

Applied Arts. The importance and beauty of Chinese porcelain and cloisonné are such as to require special treatment under the titles PORCELAIN and ENAMEL. The textile fabrics likewise are treated under VELVET and similar titles.

Bibliography. A very extensive literature on Chinese art, much of it written contemporaneously with the great art epochs, exists in Chinese; but the works accessible to Occidental readers are, for the most part, of a recent date. The following works treat, with some detail, all the arts of China: Giles, *An Introduction to the History of Chinese Art* (Shanghai, 1905); Bushell, *Chinese Art* (2 vols., London, 1904–06); Munsterberg, *Chinesische Kunstgeschichte* (2 vols., Esslingen, 1910–12); Fenollosa, *Epochs of Chinese and Japanese Art* (New York, 1912); Glaser, *Die Kunst Ostasiens* (Leipzig, 1913). The Chinese point of view is admirably expressed in Binyon, *The Flight of the Dragon* (London, 1911); Fischer, in *Repertitorium fur Kunstwissenschaft*, vol. xxxv (Berlin, 1912). Mention should also be made of such earlier works as Paléologue, *L'Art chinois* (Paris, 1888), and Hirth, *Fremde Einflüsse in der chinesischen Kunst* (Munich, 1896). For Chinese painting, consult, besides the above works, Hirth, *Scraps from a Collector's Notebook: Notes on some Chinese Painters* (New York, 1906); Sei-ichi Taki, *Three Essays on Oriental Painting* (London, 1911); Binyon, *Painting in the Far East* (London, 1913). The Japanese periodical, *The Kokka*, with Japanese and English text, contains admirable colored reproductions of Chinese paintings (Nos. 191 (1906) et seq.). For a summary of Chinese architecture, see Cram, in *Dictionary of Architecture and Building* (New York, 1901–02); Chûta Itô, in *The Kokka*, Nos. 197, 198; Boerschman, *Die Baukunst der Chinesen*, vol. i (Berlin, 1911), others to follow. For the influence of Græco-Buddhist art, consult Stein, *Ruins of Desert Cathay* (London, 1912). For sculpture, see Chavannes, *La sculpture sur pierre en Chine au temps des deux dynasties Han* (Paris, 1893). For the extensive literature on Chinese porcelain, see the bibliography of PORCELAIN.

CHINESE EMPIRE. See CHINA.

CHINESE GORDON. The name given to Gen. Charles George Gordon from his exploits in putting down the Tai-ping Rebellion in 1863.

CHINESE GRASS. See CHINA GRASS.

CHINESE HEMP. See CORCHORUS.

CHINESE IMMIGRATION. This subject first assumed importance in the United States about the year 1870, although legislation hostile to the Chinese began in California in 1855. The California Legislature investigated the subject in 1862, and the United States Congress sent a joint special committee to the Pacific coast in 1876, the voluminous report of which gives the most authentic information on the subject yet published (*Rep. 44th Cong., 2d Sess., Sen. R. 689*, p. 1281, Washington, 1877).

Up to 1868 the United States was trying to compel China to admit Americans into that country for the pursuit of trade and commerce. The first treaty (1844) with China gave Americans the right of residence in five ports and gave them the rights of extraterritorial consular jurisdiction. The Americans, though not participating in the Chinese War of 1858, secured all of the privileges obtained by other nations which were stipulated in the Reed Treaty of 1858. Nothing was said in these treaties about Chinese in America, who came here under the same conditions as the citizens of other nations. The Burlingame Treaty of 1868 deprecated involuntary immigration—aimed at coolie labor—but declared the right of migration to be an inherent one, and a special resolution of Congress (July 27, 1868) declared the right of expatriation to be a natural and inherent right of all people, the obstruction or restriction of which is inconsistent with the fundamental principles of the republic. This declaration became subsequently an object of embarrassment in dealing with the Chinese when anti-Chinese feeling on the Pacific coast made it necessary for both political parties in 1876 to insert anti-Chinese planks in their platforms. The question of abrogating the Treaty of 1868 was discussed in Congress. A bill to restrict Chinese immigration passed both Houses of Congress in 1879, but was vetoed by President Hayes because it violated the Treaty of 1868. A commission was sent to China in 1880 to negotiate a new treaty to permit the absolute prohibition of Chinese immigration. The Treaty of 1880 declared that "the government of the United States may regulate, limit, or suspend such coming or residence, but may not absolutely prohibit it." The treaty further stated that the limitation must be reasonable and apply only to Chinese laborers. The Act of 1882 suspended the immigration of Chinese laborers for 10 years and gave those in the United States or those who should arrive within 90 days after the passage of the act the right to remain, but forbade the naturalization of Chinese, and the act applied to both skilled and unskilled laborers. The act was amended in 1888, while a treaty, in which the Chinese government undertook to prohibit Chinese laborers from coming to the United States, and our government agreed to protect those here from the violence and outrages to which they were constantly subjected without redress, was still pending. The amendment prohibited the return on certificate of Chinamen once here who went back to China, declared all such certificates void, and practically made Chinese exclusion permanent. This act angered the Chinese government, which did not ratify the treaty. The Act of 1882 expired in 1892, and the Geary law continuing the exclusion for a further period of 10 years was passed May 5, 1892. The Act of 1902 continued existing legislation until further enactment should be made. It extended the exclusion laws to the island possessions and forbade the migration to the mainland or to other island groups of Chinese domiciled in one island group.

The methods by which Chinese exclusion has been accomplished have not been above reproach, but public opinion forced radical action on the part of the government. It is asserted by those who advocate Chinese exclusion that the Chinese come here not in families, but chiefly as male laborers for a temporary stay, to secure about $1500 in savings and then return to China with a competency. The difference between the American and Chinese civilization makes it almost impossible to assimilate them. They work for low wages and live very cheaply. Whether or not they would ever come to this country in sufficient numbers to constitute a menace to the economic interests of American labor, which the American workingman supposes, is doubtful.

The number of Chinese who came to the United States from 1848 to 1852, when they began to come as a result of the gold discoveries, is estimated at 10,000. From 1852 to 1854 the excess of arrivals over departures amounted to 31,861. During the next 15 years the annual departures were about as great as the arrivals; 1868 showed a net gain of 6876, and from that year down to 1876 the net gain was about 11,000 per annum. The census of 1880 showed 105,465, exclusive of Hawaii; 1890, 107,488; 1900, 89,863; 1910, 71,531. Consult Mayo Smith, *Emigration and Immigration;* Hall, *Immigration* (New York, 1906); United States Bureau of Immigration and Naturalization, *Treaty, Laws, and Regulations Governing the Admission of Chinese* (Washington, 1912); Library of Congress, *Select List of References on Chinese Immigration* (Washington, 1904). See IMMIGRATION.

CHINESE LANGUAGE, WRITING, AND LITERATURE. The language of China is ancient and important because of the vast number of human beings speaking it; but it ranks among the most rudimentary forms of speech that have maintained a long existence anywhere in the world. It is monosyllabic, each word being uttered by a single movement of the organs of speech and expressing a complete idea or thing. It is characterized by the unchangeability of the root. Hence it is without inflections or distinct parts of speech. The relation of a word is recognized by its position in the sentence and the addition of other words. The same word may often serve as noun, adjective, verb, or adverb. Gender, number, person, and case are signified, not by the form of the word itself, but by related additional words. In the absence of inflection, position and the use of auxiliary words are much more important in Chinese than in other languages. Chinese is one of the simplest languages in the world and at the same time one of the most difficult; for while there is no grammar except syntax, to be a scholar one must learn the book language in its two or three different forms, the colloquial or spoken languages in their various vernaculars, and the tones (as many, it may be, as seven to a single sound), which increase the number of simple words or roots from nearly 500 to 1200 or more. It is very difficult for a Western man to be a master of the Chinese tones. The variety of dialects and their difficulties are overcome by

what is commonly called the "mandarin," or court, dialect, the medium of official communication, which, though phonetically the poorest of the dialects, has received considerable literary cultivation. There is a vast difference between the literary and colloquial idioms. Yet, though poor in form—indeed, one of the poorest—the Chinese language has been made, through ages of cultivation and solely by the genius of those who use it, superior as an instrument of thought to many, perhaps to most, inflected languages. "The contrast between the means and production in Chinese," says Steinthal, "is a perfectly unique phenomenon in language history."

The symbols, or ideographs, of the written language, at first few in number and derived from natural or artificial objects, became stereotyped by use and so modified by contractions as presently to lose all resemblance to the original hieroglyphs. Native philologists seem to recognize some such process as this in arranging their language in "six writings" (*liu shu*), 608 imitative symbols, 107 signs of thought, 740 combined ideas (e.g., "woman" and "broom" denoting a 'wife'), 372 inverted significations (the character for "hand" turned one way meaning 'right,' the other 'left'), 21,810 phonograms—the bulk of the language—combining an imitative with a sound symbol, and 598 metaphonic symbols and combinations, for the most part accepted conventions difficult to explain. This constitutes a vocabulary of 24,235 separate words, which is approximately the total of words in good usage; though this is increased by obsolete and compound characters in Kang-hi's dictionary to 44,449. Here, as elsewhere, however, the vocabulary of ordinary life is much more limited, not far exceeding 3000; that of the nine canonical books is only 4601. Doubtless the aspect of the written character underwent a change upon the invention of the hair pencil or brush, ascribed to a general in the third century B.C., when the hard stylus ceased to be used; and other changes in the mechanics of writing must account for the obliteration of almost every semblance of its hieroglyphic origin in the modern script. There being no alphabet in Chinese, the difficulties in arranging this assemblage of arbitrary signs are very great. After various phonetic plans had been tried, the characters were classified in the sixth century by selecting the most significant part of each as its key or radical and by grouping together those in which the same element occurred. These groups were subsequently reduced from 542 to 214 in the sixteenth century, the characters under the same radical being listed consecutively according to the number of strokes required to write the extra-radical portion. This latter part—usually called the primitive—may be written above, below, on either side, or inclosed within the radical; it is necessary, therefore, to become familiar with these 214 signs before the first step can be taken in acquiring a knowledge of the written language. The number of characters listed under each of these in the dictionary varies from 5 to 1354. A remarkable limitation in Chinese is the paucity of its sounds, hardly more than 400 in the modern mandarin dialect, though possibly twice that number in the ancient language. The difficulty arising from this is relieved by the employment of tones, mentioned above, and by breathings or aspirates (e.g., *t'ang* and *tang* are two different words); but in spite of these the number of homophones is excessive and embarrassing, and the spoken tongue, with its varying dialectic pronunciations of the same written character, may be considered the most difficult in the world for an alien to acquire. Great attention is paid to its calligraphy; no educated man allows himself to write carelessly, and the appearance of a written or printed page of Chinese characters in vertical columns is more ornamental than that of a page in any other language. Six different styles of script are recognized, of which only two—the "pattern" and "running" hands—are in common use. Finally, in addition to the difficulties already enumerated, it may be said that a language which cannot express by single words such abstract ideas as space, relation, etc., must have severely restricted the intellectual development of the race compelled to employ it during 40 centuries of comparatively high civilization.

Literature. Owing to the lack of durable monuments, there are no credible texts of very ancient inscriptions in China, as there are in Babylonia and Egypt. By the sixth century B.C., when Confucius edited the famous sacred canons known as the *king*, there evidently existed a considerable literature in verse and prose already considered old. To the *king*, the model of literary form, the acme of philosophic wisdom, is largely due that extraordinary stability of Chinese thought and institutions which is the wonder of their history. They consist of the "Five Canons"—*I-king*, the 'Book of Changes'; *Shu-king*, the 'Book of History'; *Shi-king*, or 'Book of Odes'; *Li-ki*, or 'Book of Rites'; and the *Ch'un-ts'iu*, or 'Spring and Autumn,' the last being the only one claiming Confucius as the actual author—and to these are added the "Four Books": The *Lun-yü*, or 'Analects,' of Confucius, his views and maxims retailed by disciples; the "Book of Mencius"; the *Ta-hio*, or 'Great Learning,' and the *Chung-yung*, or 'Doctrine of the Mean,' a short treatise enlarging upon Confucius' teaching as to conduct. These classics of the Far East constitute as interesting a body of literature as can be found in any ancient civilization. No written product of the human mind has for so long a period or so completely molded the culture, morals, and government of a large fraction of civilized mankind. Its profound and continuous study has not only left abiding traces upon Chinese thought and institutions, but has, through veneration for the letter as well as the spirit, preserved the language almost unchanged during 3000 years, set a permanent standard of literary style, and stimulated the critical faculties of an acute people to the production of thousands of volumes of commentary and discussion. The 'Book of Changes,' probably the oldest of the "Five Canons," is ascribed to Wen-wang, the father of Wu-wang, the founder of the Chou (or Chow) dynasty in the twelfth century B.C. It consists of a series of apparently random deductions based upon the groupings of divided and undivided lines said originally to have been copied and arranged from the back of a tortoise by the Emperor Fu-hi, 28 centuries B.C. These 'eight diagrams' (*pa-kua*) consisted of a combination of continuous and broken lines, each corresponding to certain elements of nature besides representing the male principle in that old natural philosophy in continuous lines, the female in the broken lines. The male principle (*yang*) is the positive element, the female (*yin*) the negative. All good things are male, their opposites female.

These eight diagrams of triplet lines (☰, ☱, ☲, ☳, etc.) were enlarged to 64 by doubling into sextets, each representing some natural force or element and followed by a short essay ascribing to every line its highly fanciful and allegorical import. The text is followed by the so-called "Ten Wings," or commentaries, long ascribed to Confucius, but unquestionably of later origin. It is impossible to do more than guess as to the real purpose of this antique puzzle, foreign speculators calling it a philosophy, a vocabulary of pre-Chinese tribes, a calendar of the lunar year, etc., while the natives persist in venerating it as divinely inspired, though they cannot interpret its true meaning. The 'Book of History,' or *Shu-king*, embodies, like the Hebrew Scripture, fragments of very ancient documents; but its present form is the work of Confucius, who infused into its brief and rather monotonous records his ideas of virtue, statecraft, and philosophy. Though its text is not always beyond dispute, this record places China indisputably in the first rank of Asiatic nations for its authentic data on ancient times. Scarcely less important in this respect, and as a sociological document, is the 'Book of Odes,' or *Shi-king*, while its human and literary interest far surpasses all the other *king*. This poetical relic consists of 305 odes, chants, and ballads, said to have been garnered by the Sage from 3000 songs current in China at his time. They date from the eighteenth to the sixth century B.C., and many if not most of them seem to have a religious use and meaning; but it is hardly possible to exaggerate their interest to the scholar as true pictures of the life and thought of antiquity, or their value in illustrating the language, cults, and customs of old China. They have inspired 80 generations of Chinamen since Confucius expressed approval of them by declaring that "He who knows not the *Shi* stands with his face towards a wall." The fourth classic, the 'Book of Rites,' or *Li-ki*, does not properly belong to the Confucian period, being the compilation of two cousins named *Tai*, in the first century B.C. It got its present form after remodeling in the second century A.D., and until the fourteenth century was always joined with two older works—the *Chou-li* and *I-li*—both devoted, as it was, to ceremonial forms and usages. The 'Spring and Autumn Annals,' or *Ch'un-ts'iu*, is the title of a brief record of Confucius' native state between the years 722–484 B.C., written by the Sage himself, a book upon which he considered his reputation would stand for all time. It is hardly more than a simple statement of events, devoid of comment or interest, but its dry annals were expanded by the *Tso-chuan*, the illuminating commentary of his disciple, Tso-kiu Ming, who made it altogether one of the most readable accounts we have of the remote past, earning for its author the title of the Froissart of ancient China. In style and as a historical text it is so much superior to the *Ch'un-ts'iu* itself that some scholars have suggested that Confucius himself must have had a hand in it.

The "Four Books" are the works of three disciples of the Sage and of Mencius, his great expositor, in the century following his death. The 'Analects' gives some accounts of the habits and records the teachings of the great moralist as nearly as possible in his own words, thus forming an invaluable repository of information about Confucius and his moral system. In this is formulated the famous text of altruism, the Golden Rule, in its Chinese form, "What you would not others should do unto you, do not unto them"; and here are expressed his ideas as to the nature of man, the necessity of education, of etiquette, of self-repression, of filial surrender, and here his agnosticism stands out in bold relief. The "Book of Mêng-tsz'," or Mencius, supplies at rather greater length the teachings of Confucius' greatest follower, a man who subordinated his whole doctrine to the system of his master, but who in breadth and strength of character seems to have been superior to the Sage himself. Like Socrates, he devoted himself to crushing the sophists of his time, and through his learning and influence in combating heterodox philosophers he may be said to have established the supremacy of the Confucian system in the mind of China. As third among the "Four Books" comes the *Ta-hio*, the 'Great Learning,' once constituting a chapter of the 'Book of Rites.' It enlarges upon the regulation of the individual, the family, the state, and the Empire, and has conduced, theoretically at least, to the maintenance during successive ages of China's political solidarity under a system allowing considerable liberty of home rule. Lastly, the *Chung-yung*, also originally a section of the 'Book of Rites,' develops the idea of the princely man who, basing his actions upon the principle of *cheng*, or 'uprightness,' and submitting to the all-pervading *ho*, or 'harmony of the universe,' never departs from the just mean. From this source come in great part the attitude of calm and the assumption of impartiality studiously cultivated by Chinese gentlemen.

In a sense these classical works may be considered the sum and substance of Chinese literature, for not only have the example and ethical system of Confucius become supreme over the minds of his countrymen, but forms of thought and style have ever been kept subservient to these early products of the national genius. Confucius did much for his people, but he has much to answer for in repressing original speculation, freedom of research, and imagination by a colorless formalism. Such was the idea of Ts'in Shī-huang-ti the 'First Emperor' of Ts'in, who in 220 B.C. consolidated feudal China into a real empire and greatly extended its domain. In order to combat the conservative *literati* who resisted his violent and rapid reforms by preaching the doctrines of the dead past, the Ts'in Emperor decreed in 213 B.C. the destruction of all books excepting those on science, agriculture, and divination (the last saving the *I-king* alone of the classics), and forbidding their reproduction or study. The edict, which was carried out with extraordinary thoroughness, brought death upon 460 recalcitrant scholars and forms an epoch in the history of Chinese literature. The tyrant's dynasty did not endure long, and within a half century of his death the ancient learning was revived with double zest under the Han dynasty (206 B.C.–221 A.D.). The new zeal also brought with it a harvest of forgeries of old works alleged to have been discovered in hiding places, but in reality efforts of clever writers to imitate the resuscitated ancients, whose prestige in eastern Asia always far exceeds the most brilliant successes of authors among their own contemporaries. Before touching upon this revival of learning in China, however, it is proper to refer briefly to the non-Confucian literature of Taoism and the mystics.

The philosopher Lau-tzï, an earlier contemporary of Confucius, gave birth to a philosophy of quietism, the esoteric meaning of which is hard to determine. The pursuits of *tau*, as set forth in the *Tau-te king*, a work ascribed (improperly) to the teacher, suggests Hindu transcendentalism and may be derived from India. In its purity it never took much hold on the practical and worldly minded Chinese, but idealists exist even there, and to these such speculations have invariably appealed. In the fourth century B.C. there arose an author, Chuang-tzi, who illuminated for his followers the dark places of *tau* and by the charm and erudition of his style elevated his exposition to a high place in the literature of a country where style atones for all heresy. The history of the sect of *tau*, which passed from pure mysticism to the utmost pretensions of alchemy and divination, does not belong here, nor is there much more than this to be said of the numerous writings of the Buddhists, which begin here in the first century A.D., but which have never greatly affected the literary life of educated China.

While elucidations of the Confucian canons constitute an important part of the literary output of China during its mediæval period, the chief distinction of the Han era comes from the development of poetry and of historical writing. To Mei Sheng (second century B.C.) belongs the honor of first exhibiting the beauties of the five-word metre, in which form have been produced the finest specimens of the poetic art in the language. Rhymes are, of course, easily found in a monosyllabic language of few sounds, but Chinese verse calls for similar tones to perfect the rhyme and demands also the disposal of rising and falling tones in the line in accordance with a scheme which recalls the niceties of metrical arrangement among the Greeks. The identification of the human mood with nature, which was almost unknown in Europe until modern times, appears strong and fresh as a poetic *motif* in China, as elsewhere in the East, from very early ages. In our comprehension of their art, however, the need of translation is a portentous obstacle; whatever the care of the translator, there must always remain differences in standpoint, in mode of life, and intellectual environment to thwart and prejudice the resulting effect upon readers in an alien land. Where every chance allusion to history and familiar custom, where nature herself, as exhibited in an exotic clime, require explanation before the sense is secure, it is hard to keep the flowers of Chinese verse from withering when transferred to another speech. In history the language, of course, fares better, and scholars have reason to look for larger results from translations of the standard Chinese historians than from those of any other Asiatic peoples. First of these authors in time and reputation—next to Confucius, who preached but could not write history—is Ssï-ma Ts'ien (born about 145 B.C.), whose "Historical Record" relates the history of China from the Emperor Huang-ti down to nearly his own period. Its 526,500 words, all originally scratched on bamboo tablets with a stylus, have been conned and counted with such affectionate care in subsequent ages as to have become the unvarying type of historical presentation in China ever since. Each dynasty has made it a serious business to compile the nation's annals during the preceding dynasty as well as to collect records for its own reigns, and the 24 dynastic histories produced in a uniform set of 219 volumes in 1747 are an exhibit of intellectual activity creditable in the extreme to the Chinese mind, even if their pages do not glow with marks of genius or lofty imagination. These official histories are supplemented by private memoirs, local annals, travels, and topographies, and at long intervals authors have appeared to continue the work of Confucius and Ssï-ma Ts'ien by revising and condensing the national history into acceptable literary form. Such have been Ssï-ma Kuang, whose history in 360 books appeared in the eleventh century, and Chu Hi, who issued an "abridgment" in 55 books in the twelfth century. On the whole, the mass of historical literature of all kinds in China may be called enormous, a mine as yet almost unworked by European students. In the rather scant literature of foreign travel should be mentioned the accounts of the journeys of the Buddhist pilgrims Fa-hien in the fourth century and of Hüan-tsang in the seventh century to India in search of holy books and images. They seem to have inspired in China no lasting interest in foreign lands or desire to travel abroad, but by the efforts of these and other priests in translating Buddhist books much of the literature of that creed which would otherwise have perished in its extinction in India has been preserved for the researches of modern scholars.

After a long period of political disturbance and comparative intellectual sterility following the fall of the house of Han, there arose the T'ang dynasty (618–907 A.D.), during which China may be said to have reached the zenith of its intellectual life. "Poetry," declares a Chinese critic, "began with the *Shï*, developed with the *Li Sau*, burst forth and became perfect under the T'ang. Much excellent work was achieved under the Han and Wei dynasties; their writers appear to have selected good subjects, but their language was unequal to its expression." It was notably the age of lyric verse, expressed in a language which had by this time become refined and adapted to the highest literary purposes. Long flights are almost never attempted, the epic being a product altogether alien to the Chinese mind; but as tests of skill under great technical difficulties the eight-line poem and the still harder four-line epigram or "stop-short" have remained favorite forms. Professor Giles describes the invariable arrangement of the two conventional tones in the latter stanza as follows:

Sharp sharp flat flat sharp
Flat flat sharp sharp flat
Flat flat flat sharp sharp
Sharp sharp sharp flat flat

"The effect produced by these tones," he says, "is very marked and pleasing to the ear, and often makes up for the faultiness of the rhymes, which are simply the rhymes of the odes as heard 2500 years ago, many of them of course being no longer rhymes at all. Thus there is as much artificiality about a stanza of Chinese verse as there is about an Alcaic stanza in Latin. But in the hands of the most gifted this artificiality is altogether concealed by art, and the very trammels of tone and rhyme appear to be necessary aids and adjuncts to success." The names of famous poets in this era are legion, and it would be difficult as well as useless to enumerate them. Anthologies of the period are numerous and always studied for their famous poems, as they are set as standards for imitation. The

"Complete Collection," published in 1707, contains nearly 50,000 poems of all sorts arranged in 900 books. Chief among their poets must, however, be mentioned Li Po, or Li T'ai-po (705–762), and Tu Fu (712–770). The former, a sort of Chinese Anacreon, enjoyed immense popularity, became a spoiled child of the Imperial palace, where he performed prodigies of impromptu verse making when too drunk to stand, fell a victim to court intrigue, and was drowned at last, very appropriately, in a maudlin attempt to kiss the moon's reflection in a river. Rather curiously, the Chinese, though a temperate people, are passionately fond of songs in praise of wine and rejoice in a long array of poets who were more or less drunkards. On the other hand, their literature as a whole is singularly pure, standing in this respect high among those of Orientals, though social life among them is far from clean, and obscenity in familiar intercourse is often if not always condoned. Li Po's contemporary, Tu Fu, was also a court officer and favorite and likewise compelled to retire. His career resembled that of Villon and ended in the mire, but his name has been for 1000 years a household word in Asia. One of his verses will serve as a sample of the *summum bonum* of Chinese poetic art and as an illustration of what is admired in the four-line lyric epigram:

> "White gleam the gulls across the darkling tide,
> On the green hills the scarlet flowers burn;
> Alas! I see another spring has died . . .
> When will it come, the day of my return?"

It is perhaps creditable to Chinese institutions that many of their great writers have been men of official rank. In a land where the road to office has long lain through the study of letters this has resulted in efforts more or less serious on the part of every mandarin to "write," and produced in the aggregate a long list of respectable works. Among these the poet, philosopher, and statesman Han Yü (768–824), of the dynasty of T'ang, stands preëminent as a model of nobility of character, ability in high office, and remarkable elevation of literary style. His career is familiar to every well-read Chinaman, one of his compositions being customarily read by the bier as a part of the funeral service, while another, his protest to the Emperor on the subject of receiving a bone of Buddha with Imperial honors, an ode which caused him a long banishment, is one of the favorite "pieces" for reading in the language. Several women emerge from the obscurity of female life in this time and take their places among the famous men of letters in China—a galaxy which knows neither creed nor sex, which stands or falls only by the great test of an approved style.

The literary life of China decreases in originality and power after the great T'ang period, but some phases of its later periods are notable for various reasons. The Sung and some minor dynasties cover the tenth and twelfth centuries, during which renewed attention was paid to history, and Ssï-ma Kuang (1019–86) and Chu Hi (1130–1200) flourished. The latter, one of the most remarkable minds China ever produced, is famous not only as a historian, but as a philosopher, and it is his original interpretations of the classics that constitute the system or code commonly called Confucianism by foreigners. The rise of metaphysical speculation may be said to be the distinguishing mark of this era, within which, however, no phase of literature or learning was neglected and during which the invention of block printing (tenth century) gave great impetus to book making and the formation of libraries. The Mongols themselves added nothing to China's intellectual life, but their dynasty is marked by the introduction of the drama and of novels. Both of these forms of literature are as important now in China as elsewhere, and it is remarkable, in view of the passion common to all Asiatics alike for the story, that the art of fiction in its two highest forms should have been so tardy in developing here. Chinese plays, contrary to the notion accepted in the West, are usually very short, their plots being often ingenious and highly melodramatic, but seldom complicated. No scenery is used, and some of the accepted conventions are naively frank. The plays follow each other without change of scene or intermission, the sessions, like school hours in China, lasting all day long. Novels under the Ming (1368–1644) and Manchu dynasties (1644–1912) absorb increasing attention and show great ability, though the plots are often too long and intricate and the characters too numerous to suit the taste of Europeans. Their short stories are, at their best, altogether admirable, if their almost invariable introduction of the supernatural be allowed, some of them, like the *Strange Stories* (1679), ranking among the world's best *contes*. China, like modern Europe, has during recent centuries passed through the encyclopædic age, when scholars have devoted themselves to amassing great repertories of the literature, knowledge, and wit of past generations. No country, in fact, surpasses China in the wealth and variety of her dictionaries and encyclopædias of all kinds, but these can hardly be called literature. Nor does the often scurrilous wit of their proverbs and gross wall literature—anonymous placards frequently found on street corners—call for mention in an account of Chinese letters. The intellectual record of the race is, on the whole, one to be proud of and deserves more attention than it has yet received from Western scholars.

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Chief among translations of important works stand: Legge, *Chinese Classics* (new ed., 8 vols., Oxford, 1893–95); also in vols. iii, xvi, xxvii, and xxviii of Müller's *Sacred Books of the East;* Beal, *Texts of Taoism*, ib., vols., xxxix and xl (Oxford, 1892); Giles, *Strange Stories from a Chinese Studio* (London, 1879) and *Chinese Poetry in English Verse* (ib., 1898); also his *Chuang Tzŭ* (ib., 1889); Loomis, *Confucius and the Chinese Classics* (San Francisco, 1867); Marquis d'Hervey de Saint-Denys, *Poésie de l'époque de T'ang* (Paris, 1876); C. de Harlez, *La poésie chinoise* (ib., 1893); Carus, *Lao-Tze's Tao-Teh-King* (Chicago, 1898); Chavannes, *Mémoires historiques de Sse-ma Ts'ien* (Paris, 1895–1905); Bazin, *Théâtre chinois* (ib., 1838);

warm southwest wind of the Pacific Ocean that had crossed over the Rocky Mountain Range; indeed, the moist southwest winds on the coasts of Oregon and Washington have also been called "chinook winds." It is a mistake to think that the Montana chinook originates over the warm waters of the Pacific; it is essentially a descending wind and owes its temperature and dryness to this fact; it belongs to the same class as the föhn winds of Switzerland. Several very different combinations of conditions may cause descending winds, but in any case descending air by coming under greater pressure must be compressed and therefore warmed up at the rate of about 1° F. for each 183 feet of descent, or 1° C. per 100 meters. Therefore a fall of 5500 feet, such as is very common in flowing over the Rockies, will raise the temperature of the air by 30°, and as this warmth is very slowly lost, the warm air spreads over a wide extent of ground. The hot winds of Kansas and Iowa undoubtedly also owe their high temperatures to the fact that the air is descending rapidly. As no moisture is added to the mass of descending air, the föhn winds of Switzerland, the chinooks of Montana, and especially the hot winds of Kansas are extremely dry and evaporate and absorb any snow or moisture at the surface of the ground. The proper explanation of chinooks was first given by G. M. Dawson, 1879–80, but the most important early paper on the subject was by Prof. Mark W. Harrington of the University of Michigan, in the *American Meteorological Journal*, vol. iii (Ann Arbor, 1887).

CHINOOK JARGON. An important trade jargon, formerly constituting the chief medium of intercommunication among all the tribes of the Pacific coast from northern California far up into Alaska and throughout the Columbia region. Owing to its great usefulness over a wide area, considerable attention was given to it by traders and missionaries, despite its mongrel and skeleton character. According to an analysis of 500 words, two-fifths are of Chinook origin, two-fifths from other Indian languages and Canadian French, and one-fifth from the English, all, however, being softened and modified to suit the phonetic deficiencies of those using the jargon. Consult: Hale, *Manual of Oregon Trade Language* (London, 1890); Gill, *Dictionary of Chinook Jargon* (Portland, Oreg., 1891); Boas, "Chinook Texts," in *Smithsonian Bureau of Ethnology* (Washington, 1894); Pilling, "Bibliography of Chinook Languages," in *Smithsonian Bureau of Ethnology* (Washington, 1893).

CHINOOK SALMON. The common and most valuable salmon of the Pacific coast. See QUINNAT SALMON; SALMON.

CHINQUAPIN. See CHESTNUT.

CHINS. A general name applied to certain peoples of a more or less primitive type inhabiting the mountains of Assam, Arakan, the Burmo-Chinese frontier, etc., known variously as Chins, Kakhyens, Khyens, Katchins, or Singhpos. Physically they are now somewhat mixed with the other peoples of this area, Karens, Burmese, and Shans, with perhaps a later Hindu and an earlier Dravidian strain, the whole resting upon a Mongoloid (Sinitic) basis. Some of the Chins are very warlike and great hunters. By language they seem to belong in the Tibeto-Chinese stock, being nearest related to the Burmese. Besides the general works on Assam, Burma, etc., the literature relating to the Chins includes Anderson, *Mandalay and Momien* (London, 1876), and Reid, *Chin-Lushai Land* (ib., 1893); and, particularly, for data on mythology and religion, material culture, ethnology, etc., the articles of Father Gilhodes in *Anthropos* for 1908–10, and the monograph of Wehrli, *Beitrag zur Ethnographie der Chingpaw* (Leiden, 1904). The Chins of Dardistan belong to another race altogether and speak an Aryan tongue.

CHINSURA, chĭn-sōō'rȧ. A former town in Bengal, British India, on the right bank of the Hugli, 20 miles above Calcutta, now incorporated with Hugli (q.v.), Hugli-Chinsura (Map: India, E 4). Chinsura was originally the chief Dutch settlement in Bengal and was established in 1656. It was ceded in 1824 to the British, together with other places on the mainland, in exchange for the English possessions in the island of Sumatra. It is noted for its educational institutions, including Hugli College and many missionary schools, but is now slowly declining. Its industry is unimportant.

CHINTREUIL, shăN'trē'y', ANTOINE (1814–73). A French landscape painter, born at Pont-de-Vaux (Ain). He was the most important of Corot's pupils and succeeded better than any other in expressing in his work the poetic sentiment of his master, yet without losing his own individuality. His subjects are chiefly misty melancholy plains, sunlit thickets, and grassy clearings. They are found in most of the French provincial museums; the Louvre possesses three of the best: a "Thicket with Deer," "Space," and "Rain and Sunshine" (1873), his masterpiece.

CHINTZ (Hind. *cīnt, cīt,* Beng. *cīt,* chintz, from Skt. *chitra,* spotted, variegated). A highly glazed printed cotton fabric, with a pattern in many colors on a white or light-colored ground. It was used for bed hangings and other purposes where gay colors were desired and where there was much exposure to dust, which does not readily adhere to its highly calendered surface. See CRETONNE.

CHIO, kē'ō. See CHIOS.

CHIOGGIA, kyŏ'jȧ, or **CHIOZZA,** -dzȧ (mediæval *Clugia,* from Lat. *Fossa Claudia*). An episcopal city and fortified seaport of Italy, in the Province of Venice, 18 miles south of Venice (to which there are frequent daily steamboats) and 63 miles by rail southeast of Padua (Map: Italy, G 2). It is built on piles and is surrounded by the Lombardo Ship Canal. The Vena Canal, which is crossed by nine bridges, cuts it in two, and it is connected with the mainland by a stone bridge, 800 feet long, with 43 arches. The cathedral dates from 1633, the Board of Trade building from 1322. The inhabitants have always been distinguished by quaint customs, costumes, and dialect, and the fisheries have long been important. The other principal industries are flax spinning, shipbuilding, and the manufacture of sails, bricks, candles, and lace. The rivalry of Genoa and Venice was decided here, Dec. 23, 1379, by the victory of the Venetian fleet. Pop. (commune), 1881, 28,000; 1901, 30,563; 1911, 35,052. See VENICE, *History.*

CHION, kī'ŏn (Lat., from Gk. Χίων). A native of Heraclea, on the Euxine Sea, son of Matris and pupil of Plato. In conjunction with Leonides and others, he tried, in 352 B.C., to liberate his native city from the tyranny of

Clearchus. Clearchus was killed, but his brother, Satyrus, brought about the death of chion and reasserted the tyranny. Seventeen extant letters are wrongly ascribed to Chion.

CHIONIDES, kī-ŏn'ĭ-dēz (from Gk. Χιονίδης). A Greek comic poet, whose representations date from 487 B.C. He is called the earliest writer of the Old Attic Comedy in that he was the first to impart to it its characteristic spirit of censorious criticism, whether of morals, politics, or literary taste. The extant fragments of his works have been edited in Meineke, *Fragmenta Comicorum Græcorum* (Paris, 1839–57), and Kock, *Comicorum Atticorum Fragmenta*, vol. i, pp. 4–7 (Leipzig, 1880–84).

CHIOS, kī'ŏs (Gk. Χίος, *Chios;* Turk. *Sagis adásch; Scio* in the Genoese form). A Turkish island 7 miles off the west coast of Asia Minor, about 50 miles in a direct line west of Smyrna (Map: Turkey in Asia, A 3). Its length from north to south is 32 miles; its greatest breadth, 18; area, about 318 square miles. Chios is one of the largest islands in the Ægean Sea and is, or was, until the terrible earthquake of 1881, one of the most productive and beautiful, the name having furnished in ancient times a synonym for wealth and profligacy. The surface is largely occupied by chalky limestone mountains, which in the north reach an altitude of 4080 feet in Mount Oros. Along the centre of the east coast lies an extensive plain around the capital, Chios. It is a rich and picturesque district, abounding in vines and orange, lemon, and almond trees, and embellished with villas. The climate is dry, especially in summer, and delightful. The wine of Chios, famous in antiquity, is still of some repute. Oil, cotton, and the usual fruits of that latitude are produced, and in the southwestern part a well-known variety of mastic. Cheese, silk, wool, and silk and woolen stuffs, as well as grain, cattle, salt, and preserved fruits, figure prominently among the products. The leading export articles are leather, mastic, fruits, and distilled spirits. The leading imports are hides and grain. Chios, with the islands, forms a sanjak of the archipelago (Jezairi-Bahri-Sefid) vilayet and has a population of 59,600, mostly Greeks. The population of the capital (Chios or Kastro) is about 14,250. The city has an aga, a bishop of the Greek church, and is, with its new haven, protected by a fortress.

In early times the island was colonized by the Ionians and remained an independent and powerful state till 546 B.C., when it was subdued by the Persians. It took part in the Ionian revolt and contributed 100 vessels to the Greek naval force which was defeated at the battle of Lade (494). From that time until 479 it was again subject to the Persians, but in the latter year it was freed from the Persian yoke, and became in 477 an independent member of the Delian Confederacy. In 415 it took part in the Sicilian expedition with 50 ships. The island remained on its original footing of autonomous ally of Athens, retaining its armed force, its ships, and its fortifications, until 412 B.C., when it attempted to revolt—an attempt which led in the end to its conquest and devastation. It supported the Romans in their wars in the East, and was made by them a free and allied state. In more recent times the island has changed hands repeatedly and has experienced many vicissitudes of fortune. In 1089 it was devastated by the Turks under Tzachas. In 1172 it was in the possession of the Doge of Venice, Vital Michieli. In 1346 it fell into the hands of the Genoese, and in 1566 it was taken by the Turks, in whose hands it has since, except for a short interval (1694–95), remained. It was conferred as private property upon the Sultana, enjoyed her protection, and consequently prospered. In 1822, a number of the Sciotes having joined the Samians in a revolt against Turkey, the island was attacked by a Turkish fleet and army, and the inhabitants were mercilessly slaughtered or sold as slaves. The town and island were laid waste. The island has since recovered, however, and is now in a prosperous condition. In recent years the island has suffered from earthquakes, notably in March, 1881, when much property was destroyed and over 5000 persons lost their lives.

On Nov. 24, 1912, in the course of the Balkan War (q.v.), a Greek expedition effected a landing on the island and after a stubborn campaign obliged the last Turkish garrison to surrender, Jan. 3, 1913. By the Treaty of London (May 30, 1913) the final political disposition of Chios was left to the arbitrament of the Powers, and this arrangement was confirmed by the Treaty of Athens between Greece and Turkey (Nov. 13, 1913).

CHIOS, HIPPOCRATES OF. See HIPPOCRATES OF CHIOS.

CHIOZZA. See CHIOGGIA.

CHIP'MAN, NATHANIEL (1752–1843). An American jurist and politician. He was born in Salisbury, Conn., graduated at Yale in 1777, served as a lieutenant in the Revolutionary army, and was at the battles of White Plains and Monmouth. He was admitted to the bar in 1779 and began practice in Vermont, where he served in the Legislature in 1784–85 and became a judge of the State Supreme Court in 1786 and Chief Justice in 1789. In 1791 he was a member of the convention called to decide whether Vermont should join the Union, and was one of the commissioners to arrange for the State's admission. He was judge of the United States Court for the district of Vermont in 1791–93. He served as United States Senator in 1798–1804, in the State Legislature in 1806–09 and 1811, and was again Chief Justice of the Supreme Court in 1813–15. In 1826 he revised the laws of the State. He was professor of law in Middlebury College from 1816 to the time of his death. He published *Principles of Government: A Treatise on Free Institutions* (1833) and other works of a similar character. Consult the memoir (Boston, 1846) by his brother Daniel (1765–1850), also a prominent Vermont jurist.

CHIP'MAN, WARD (1787–1851). A Canadian jurist, born in St. John, New Brunswick, son of a Massachusetts Loyalist (1754–1824) of the same name. He graduated at Harvard College in 1805, and was crown agent for determining the northwest "angle" of Nova Scotia in 1824–29. He was Advocate-General, clerk of the circuits, and Solicitor-General, puisne judge of the Supreme Court (1825), and Chief Justice (1834). He was also President of the Legislative Council and Speaker of the Assembly.

CHIP'MUNK (N. Amer. Indian, probably originally imitative). An American ground squirrel of the genus *Tamias*, which forms a connecting link between the arboreal squirrels proper and the spermophiles. It is a small animal, about 6 inches long, with a slender 4-inch tail. The color is reddish brown or gray, with

black and white stripes on the back. The chipmunk (*Tamias striatus*) is one of the commonest and most pleasantly familiar animals in eastern North America, living in stone walls and stumps. Four geographical races are recognized. It is almost always to be found along old fences and hedgerows, especially near woods, and lives in a burrow, wherein it stores for winter use large quantities of small nuts, acorns, etc., and where it remains in a snug nest until spring, frequently appearing, however, on the warmer days. Other species occur in the central and western United States, of which the "four-lined" is extremely numerous and active throughout the whole Rocky Mountain region. (See Plate of SQUIRRELS.) For life history, consult Thompson Seton, *Life Histories of Northern Animals* (New York, 1909). For systematic review of the genus, consult J. A. Allen, *American Museum of Natural History Bulletin*, vol. iii (New York, 1890).

CHIPPAWA, chĭp'â-wä. A village and port of entry in Welland Co., Ontario, Canada, at the junction of the Chippawa with the Niagara River, 2 miles above the great falls, and on the Michigan Central Railroad. An electric railway running from Queenston terminates at Chippawa. Here Maj. Gen. Joseph Brown, July 5, 1814, with 1900 Americans defeated the English under Major General Rial, who had 2100 men. The Americans had 68 killed and 267 wounded and the English 138 killed and 365 wounded. Pop., 1910, 707.

CHIPPENDALE, THOMAS (?–1779). A famous English cabinetmaker of the eighteenth century, who, with his father of the same name, a carver and maker of picture frames, moved from Worcester to London before 1727. He took a shop in Conduit Street, Long Acre, at Christmas, 1749, and four years later moved to larger premises at 60 St. Martin's Lane. In April, 1754, he published the first edition (two following) of his *The Gentleman and Cabinet Maker's Director*, and by 1760 he had become so prominent as to be elected a member of the Society for the Encouragement of Arts, Manufactures, and Commerce, an organization that still flourishes. Chippendale's name in this connection appears in an autograph book with those of Sir Joshua Reynolds, Edward Gibbon, Samuel Richardson, Dr. Johnson, David Garrick, Horace Walpole, the Earl of Bute, and John Wilkes. From 1766, when his partner, Ranney, died, until his own death, Nov. 13, 1779, Thomas Chippendale carried on his business alone; he was succeeded by his eldest son, Thomas, in partnership with Thomas Haig. For facsimile reproductions of two of the firm's bills, consult MacQuoid, *History of English Furniture*, vol. iii (New York, 1904–08). Much of the furniture enumerated in these bills is still in existence and illustrated by MacQuoid. Consult, for detail, Simon, *English Furniture Designers of the Eighteenth Century* (London, 1905).

CHIPPENDALE CHAIRS. The great name in chair making is Chippendale. For many years before and after the middle of the eighteenth century he flourished in London, and his famous book, *The Gentleman and Cabinet Maker's Director*, published in 1754 and sold mainly to the trade, brought him posthumous reputation as well as immediate business. Ever since then the strongest and handsomest chairs used in England and America, and to some extent in Germany, have been Chippendale chairs made in the master's own shop or reproduced from them and his book. Thomas Chippendale was a genius in the workroom. Chinese and rococo, Dutch and Gothic, were all alike to him. From bad designs as well as from good designs, made by architects as well as by professional furniture designers, he produced models that are marvelous for beauty of proportion, comfort in use, strength, and durability. Characteristic of Chippendale chairs is the carved and pierced openwork of the splat in the back. Chairs of the Hogarth and Queen Anne type that preceded Chippendale have a solid splat. Also characteristic is the starting of the splat in the rail of the seat. The backs of Hepplewhite and Sheraton chairs, that followed Chippendale, are supported entirely by the side posts and consequently look fragile even when they are not. The only chairs built by Chippendale for the great architect Robert Adam came through absolutely Chippendale in construction and feeling, though completely classic in line, made in light mahogany and after designs by Adam. Chippendale's favorite wood was dark mahogany, and his favorite ornament carving. Inlay and the fancy woods in light colors affected by Hepplewhite and Sheraton, he avoided. While Chippendale's book in its different editions shows many kinds of furniture besides chairs—some of it atrocious, particularly the rococo mirrors—and he undoubtedly made all kinds in his shop, his fame rests upon his chairs.

Consult: Chippendale's own book named above; MacQuoid, "The Age of Mahogany," vol. iii of his *History of English Furniture* (London, 1904–08); Foley, *The Book of Decorative Furniture*, 2 vols. (New York, 1911); Lockwood, *Colonial Furniture in America* (ib., 1903); Singleton, *The Furniture of our Forefathers* (ib., 1901); Strange, *English Furniture* (London, 1901).

CHIPPENHAM, chĭp'en-am. A market town in Wiltshire, England, on the Avon, 22 miles east of Bristol (Map: England, D 5). Chippenham is famed for its markets of cheese and corn, its cheese market being one of the largest in Britain. Pop., 1901, 5000; 1911, 5332. Near the town is Lacock Abbey. It was the scene of the signing of the famous Treaty of Chippenham, or Wedmore, in 878, between King Alfred the Great and the Danish leader Guthrum.

CHIPPEWA, chĭp'pê-wä. See OJIBWA.

CHIPPEWA FALLS. A city and the county seat of Chippewa Co., Wis., 105 miles east of St. Paul, Minn., on the Chicago and Northwestern, the Chicago, Milwaukee, and St. Paul, and the Minneapolis, St. Paul, and Sault Ste. Marie railroads, and on the Chippewa River (Map: Wisconsin, B 4). It contains a public library and a fine county courthouse, and is the seat of the State Home for the Feeble-minded and the County Insane Asylum. Tone Rock battleground, near the city, is of interest as the scene of a Sioux-Ojibwa conflict. The city has fine water power, carries on a considerable trade in lumber, and manufactures beet sugar, chairs, sashes and doors, flour, shoes, gloves, beer, woolen goods, foundry products, etc. It is especially noted, however, for the pure spring water which is obtained from the Chippewa Springs and which is shipped to all parts of the United States and to the Orient. Settled in 1838, Chippewa Falls was chartered as a city in 1870. The government is administered under a general State law, by a mayor and a council. Pop., 1900, 8094; 1910, 8893.

CHIPPEWA RIVER. A river of Wisconsin, rising in the northern part of the State, about 30 miles southeast of Ashland, on Lake Superior (Map: Wisconsin, B 3). It flows southwest, meeting its west branch in Sawyer County, and, receiving the Flambeau from the east and the Red Cedar from the west, empties into the Mississippi River at the lower end of Lake Pepin. It flows through the great lumber region of the State. At Chippewa Falls there is good water power.

CHIP'PEWY'AN. A nomadic hunting tribe of Athabascan stock, roaming over the country along Great Slave River from Lake Athabasca to Great Slave Lake. The name, which must not be confounded with Chippewa or Ojibwa (q.v.), is of Cree origin and signifies 'pointed coat,' referring to a characteristic fur garment worn by the men. They are also frequently known as Athabasca, from the lake near which they reside. They number about 1000, all now Christianized by Catholic missionaries. Consult Goddard, *Texts and Analysis of the Cold Lake Dialect* (New York, 1912).

CHIP'PING WYCOMBE, wĭk'ăm. See WYCOMBE.

CHIP'PY, or CHIPPING SPARROW (so called from its note). One of the smallest and most numerous of the migratory American sparrows (*Spizella passerina*, or *socialis*), distinguished by its small size, unspotted, ashy blue breast, and chestnut cap. It is a general favorite because of its gentle manners and familiarity. It builds its nest in shrubs, of grass and fine roots, and always lines it with horsehairs, whence it is sometimes called "hairbird." The eggs are four or five in number, blue, speckled at the larger end with blackish brown. Two or three broods are reared in a season. (For illustration, see SPARROW.) Like other sparrows, the chippy feeds chiefly on seeds, but it often eats insects too. It is by no means a songster, but the usual *chippy-chippy-chippy* forms a trill that is musical and sweet. Consult Weed, "Feeding Habits of the Chipping Sparrow," *New Hampshire College Agricultural Experiment Station Bulletin 55* (Durham, 1898), from which it appears that the bird does good service for the gardener as a destroyer of insects and should be protected and encouraged. See SPARROW.

CHIQUICHIQUI (chē'kē-chē'kē) **PALM** (So. Amer. Indian). A palm (*Leopoldinia piassaba*) called "piassaba" in northern Brazil. It is one of the species yielding piassaba fibre, which is employed in the manufacture of brushes. The piassaba fibre exported from Pará is partly obtained from it. It grows in swampy or occasionally flooded lands, on the banks of the Río Negro and other rivers of Venezuela and the north of Brazil, and has a crown of very large, regularly pinnate leaves, with smooth, slender stalks. The leaves, like those of many other palms, are much used for thatching.

CHIQUINQUIRÁ, chē-kēn'kē-rä'. A city in the Department of Boyacá, Colombia, situated 44 miles west of Tunja and 8600 feet above sea level (Map: Colombia, C 2). The town is famed for its Dominican Conventual Chapel having a miraculous picture of the Virgin. The chapel is visited annually by some 30,000 pilgrims, which number swells to 50,000 every seventh year, the time of public celebration. The permanent population is about 13,000. Its educational facilities are good, there being one State college, one private College of Philosophy and Letters, three colleges for women, and one higher school for men.

CHIQUITO, chē-kē'tō (Sp., very small). A group of tribes constituting a distinct linguistic stock, between the headwaters of the Mamoré and the Paraguay, eastern Bolivia. Their territory included the region between 16° and 18° S. lat. and 59° and 64° W. long. They are of rather small stature, whence, according to some, the name, which has also been explained as referring to the small entrance to their houses, and were originally agricultural, but warlike, living in palisaded villages with houses regularly ranged in streets. They resisted the Spaniards for nearly two centuries, but in 1691 accepted the Jesuit missionaries, who established flourishing mission communities among them. In 1831 they were found at Buenvista de Santa Cruz, San Francisco Xavier de Chiquitos, Concepción, San Ignacio, San Miguel, Santa Ana, San Rafael, San José, San Juan, and Santo Corazón; some also at Casalavasco, whither they had been transported by the Brazilians. They selected the Chiquito language proper as the general medium of communication among the converts, who numbered over 50,000, representing nearly 50 tribes, including the Curuminaca, Corabeca, Covareca, Curaveca, Curucaneca, etc. On the expulsion of the Jesuits in 1767 the communities rapidly decayed, and within a generation nearly two-thirds of the Chiquito race had disappeared. A considerable body still survives, living in straw-thatched adobe houses, cultivating cotton and sugar cane, and weaving ponchos and hammocks. Some of the old tribal differences still exist in the Chiquitan villages. Consult Cardûs, *Las Misiones Franciscanas entre los infieles de Bolivia* (Barcelona, 1886), and Adam and Henry, *Arte y vocabulario de la lengua Chiquita* (Paris, 1880).

CHIR. See CHEER PHEASANT.

CHIRIGUÁNOS, chē'rē-gwä'nōz. An important Indian tribe, of Tripian stock, occupying a considerable area in southern Bolivia, massed about the region of 63° W. long. and 19°–22° S. lat. They resisted alike the Incas and the Spaniards and were very adverse to accepting Christianity. At one time the Chiriguános seem to have been in confederacy with the Calchaquís, and some authorities would trace Calchaquí culture among them. Consult: Del Campana, "Notizie intorno ai Ciriguani," in the *Archivio per l'Artopologia*, vol. xxxii, pp. 17–144 (Firenze, 1902); Nordenskiöld, *Indianerleben El Gran Chaco*, pp. 173–303 (Leipzig, 1912); Church, *Aborigines of South America*, pp. 206–227 (London, 1912).

CHIR'IMOY'A. See CHERIMOYER.

CHIRIQUI, chē-rē-kē'. A lagoon in the Mosquito Gulf and at the west extremity of Panama (Map: Central America, F 6). The name is also given to a river and mountain range of Panama. The lagoon, which is about 35 miles long and extends inland from 12 to 15 miles, has three entrances and is navigable to the largest vessels.

CHIROGALE, kī'rō-gāl (from Gk. χείρ, *cheir*, hand + γαλῆ, *galē*, weasel). A genus (*Chirogaleus*) of small arboreal lemurs of Madagascar, which curl up in holes of trees and pass the dry season in torpidity. "Before this takes place an immense deposit of fat accumulates upon certain parts of the body, especially upon the basal portion of the tail, . . . which by the time they emerge from their torpor has acquired its normal proportions. The smallest

species . . . live in nests among the small branches on the tops of the highest trees, feeding on fruit and insects." Lydekker, *Mammals* (London, 1891). See Plate of LEMURS.

CHIROL, chĭr'ol, SIR VALENTINE (1852–). An English journalist and writer on the Orient. He was educated in France and Germany, receiving the degree of bachelier-ès-lettres from the University of Paris; was a clerk in the British Foreign Office in 1872–76, traveled in the East and in the United States, was Berlin correspondent for the London *Times*, and was director of the foreign department of the *Times* from 1899 to 1912. In the latter year he was knighted, and was appointed to a commission to inquire into the Indian public services. He wrote: *'Twixt Greek and Turk* (1881); *The Far Eastern Question* (1896); *The Middle Eastern Question* (1903); *Indian Unrest* (1910).

CHIROLEPIS, kī-rŏl'ê-pĭs. See CHEIROLEPIS.

CHIROMANCY, kī'rō-măn'sĭ (from Gk. χείρ, *cheir*, hand + μαντεία, *manteia*, divination), or PALMISTRY. The art of divination through the study of the palm of the hand. The interpretative science of the hand in general is termed "chirosophy." It is divided into two branches—chirognomy, which is concerned with studying man's tendencies through the form of the hand and the fingers, and chiromancy, which pretends to foretell by inspecting the lines of the palm. Chiromancy is an ancient art which was known among the Chaldæans, Assyrians, Egyptians, and Hebrews, and was cultivated by the philosophers Plato, Aristotle, Antiochus, Ptolemy, and others. Aristotle found on an altar dedicated to Apollo a treatise on chiromancy, written in letters of gold, and presented it to Alexander the Great as a gift worthy of his lofty mind. The subject is referred to in Aristotle's *Hist. Animalium* (i, 15) and in the *Problemata* and *Physiognomica*, doubtfully assigned to him. A reference in Juvenal (Sat., vi, 581) indicates that the art was practiced among the Romans. That chiromancy was practiced and accepted seriously in the Middle Ages we know from frequent references to it in the writings of that period. Albertus Magnus, Paracelsus, and Cardanus seem to have been greatly interested in the subject. Later it became involved in jugglery, until in the nineteenth century it again received a certain amount of serious consideration, owing largely to the work of two Frenchmen—Adrien Adolphe Desbarrolles (1801–76) and Casimir Stanislas d'Arpentigny (born 1798), an officer in the French army.

Palmistry treats mainly of the mounts of the hand, with the lines on them and the lines interlacing the palm. The left hand is usually the one studied, since it is less affected by use. There are seven mounts—that at the base of the first finger is the mount of Jupiter; the middle finger, the mount of Saturn; the ring finger, the mount of Apollo; the little finger, the mount of Mercury; beneath Mercury, the mount of Mars; at the wrist, the mount of the Moon; and at the thumb, the mount of Venus. More important even than the mounts are the four great lines—the lines of life, of the head, of the heart, and of fortune. The three first named suggest the letter M and represent the trinity of human existence—sensation, intelligence, and action. The line of life, which follows the mount of Venus and meets the line of the head, determines the length of life, possibility of illness, etc. The line of the head, which crosses the palm obliquely from Jupiter to Mars, indicates the intellectual quality. The line of the heart, which crosses the hand horizontally from Jupiter to Mercury, indicates worth of character; the nearer the line approaches Jupiter the better the character. The line of fortune, which cuts the hand vertically, if clear and straight foretells a prosperous life. Other lines of special interest are the Venus line, the line of the liver, and the line of Apollo. In general, the lines indicate the strength or weakness of tendencies, according to their length and clearness.

Each mount indicates a certain quality; conversely, every missing mount denotes the lack of a corresponding quality. Jupiter normally developed indicates love of honor and a happy disposition; Saturn, prudence and wisdom and therefore success; Apollo, a love of the beautiful and noble aspirations; Mercury, a love of science, industry, and commerce; Mars, courage and resolution; the Moon, a dreamy disposition and moral character; Venus, a taste for beauty and an amorous temperament. Besides the mounts and the lines are squares, stars, circles, points, triangles, crosses, rings, branches, chains, forks, islands, etc., which corroborate or modify, according to their situation, the indications deduced from the inspection of the mounts, the lines, the form of the hand, and the nails.

Bibliography. D'Arpentigny, *La chirognomie* (Paris, 1843); Desbarrolles, *Les mystères de la main* (ib., 1879), and his *Révélations complètes* (ib., 1879); Lenormand, *Souvenirs prophétiques d'une sibylle* (ib., 1814); Firth and Heron Allen, *Chiromancy, or the Science of Palmistry* (London, 1883); L. Cotton, *Palmistry and its Practical Uses* (ib., 1890); Wood, *Scientific Palmistry* (ib., 1900); Oxenford, *Modern Palmistry* (ib., 1900); Benham, *The Laws of Scientific Hand Reading* (New York, 1903); Cheiro, *Cheiro's Memoirs: The Reminiscences of a Society Palmist* (London, 1912). See SUPERSTITION.

CHIRON, kī'rŏn (Lat., from Gk. Χείρων, *Cheirōn*). The most famous of the Centaurs (q.v.), the son of Cronus and Philyra, distinguished from the other Centaurs by his mildness and wisdom and the general benevolence of his character. In works of art he has a nobler and more human bearing. Many Greek heroes—Achilles, Actæon, Alcon, and even Apollo—were educated by Chiron. He was skilled in medicine and was considered the inventor of the lyre. Consult Mannhardt, *Wald- und Feldkulte* (Danzig, 1875–77).

CHI'ROPRAC'TIC. A system of manipulations which aims to cure disease by the mechanical restoration of displaced or subluxated bones, especially the vertebræ, to their normal relation. It is claimed that slight displacements of the spinal segments are frequent, that they constrict important nerves and arteries, and that chiropractic adjustment corrects the displacement and relieves the pressure. In 1913 there were said to be over 5000 practitioners of the art in the United States and about 1000 students attending seven schools.

CHIROPTERA, kī-rŏp'tê-rà (Neo-Lat. nom. pl., from Gk. χείρ, *cheir*, hand + πτερόν, *pteron*, wing). An order of mammals, the bats, characterized by the possession of membranous wings (*patagia*) supported upon the highly modified bones of all limbs and extended by the greatly prolonged metacarpals and phalanges of the *manus*. (For details, see BAT.) This order is regarded as an ancient offshoot of the Insec-

tivora, to which it is allied in dentition and many features of internal structure; it is also allied to the Primates in dental characters and especially in the structure and external characteristics of the generative organs. Hence it is usually classified in a linear arrangement next to the Insectivora. It is divided into two suborders—*Frugivorous megachiroptera*, or fruit eaters, and *Animalivorous microchiroptera*, or insect eaters. Geologically the history of the order begins in the Eocene age.

CHIROSOPHY. See CHIROMANCY.

CHI'ROTHE'RIUM. See CHEIROTHERIUM.

CHIRU, chē'rū (Hind., from Tibetan). An antelope (*Pantholops hodgsoni*) inhabiting the pine forests and elevated plains of Tibet. It is about 32 inches in height, pale fawn in color, with a black face in the bucks, and these alone have long, gazelle-like horns. They sometimes gather in autumn into great herds and always tax the stalker's patience by their watchfulness.

CHIS'ELMOUTH'. A large, blackish chub (*Acrocheilus alutaceus*) of the Columbia River, also called "hardmouth" and "squaremouth," in reference to the blunt, fleshy mouth, the lower lip of which is covered with a firm, sharp-edged cartilaginous plate. It is occasionally eaten.

CHISHOLM, chĭz'om. A village in St. Louis Co., Minn., 98 miles by rail northwest of Duluth, on the Great Northern and the Duluth, Missabe, and Northern railroads (Map: Minnesota, E 3). It is in a productive agricultural and lumber region and has large deposits of iron ore, which is the chief product. The village contains a library. Pop., 1910, 7684.

CHISHOLM, HUGH (1866–). An English publicist and editor. He was born in London, was educated at Felsted School and at Corpus Christi College, Oxford, of which he was scholar, and became a barrister of the Middle Temple in 1892. As a journalist he advocated imperialism, tariff reform, and colonial preference, and was assistant editor (to Sidney Low) in 1892–97 and editor in 1897–1900 of the *St. James's Gazette*. With Sir Donald Mackenzie Wallace and President Arthur Twining Hadley of Yale, he edited the supplement to the ninth edition of the *Encyclopædia Britannica* published under the auspices of the London *Times* in 1902. A year later he became editor of the eleventh edition of the same Encyclopædia, and he edited the *Britannica Year Book, 1911–12* (1913). In 1913 he became day editor of the London *Times*.

CHISLEHURST, chĭz''l-hērst, or **CHISELHURST.** An urban district in Kent, England, 11 miles southeast of London. It was here, at Camden House, that the exiled Napoleon III fixed his residence in 1871 and died, Jan. 9, 1873. Chislehurst remained the residence of the Empress Eugénie until 1880. Pop., 1901, 7400; 1911, 8666.

CHISOLM, WILLIAM WALLACE (1830–77). An American official, born in Morgan Co., Ga. In 1847 the family removed to Kemper Co., Miss. As a Union sympathizer he was elected sheriff by the negroes after the war and reëlected in 1873. He was an able party leader and succeeded in making the county the chief rallying point of the Republican party in the State. He was arrested in the spring of 1877, charged with murdering John W. Gully, a Democratic leader, who had been shot near Chisolm's dwelling. Chisolm's family, consisting of his wife, three sons, and a daughter, voluntarily accompanied him to jail. On the morning following his arrest the doors of the jail were demolished by the mob, which probably consisted largely of members of the Ku-Klux Klan. Chisolm's son, a boy of 13, was shot; his daughter of 18 mortally wounded; and Chisolm himself was fatally injured. A negro in December, 1877, confessed to murdering Gully, but did not implicate Chisolm. His death at the hands of the mob was due in part to race and partisan prejudice, in part to the abuses of power by the radicals and negroes. The episode of Chisolm's death suggested a chapter in Tourgée's *A Fool's Errand*. An equally exaggerated account is Wells's *Chisolm Massacre* (1877). The other side is told in Lynch, *Kemper County Vindicated* (1879).

CHISOLM v. GEORGIA. A noteworthy case decided by the Supreme Court of the United States in 1793 and reported in 2 Dallas Reports, 419. In 1792 Alexander Chisolm, a citizen of South Carolina, sued the State of Georgia in the Federal courts, but the State refused to make an appearance in the suit. The Supreme Court, when the case came before it, took occasion to review the origin and nature of the Union, and decided that a State could properly be made a party defendant to such a suit under the grant to the Federal courts, in the Constitution, of judicial power over cases "between a State and citizens of another State." The agitation incident to such a decision, apparently invading the "sovereignty" of each State, led shortly thereafter to the adoption of the eleventh amendment to the Constitution, providing that the Federal judicial power should not extend to any suit brought against a State by a citizen of another State or of a foreign State. Later, efforts were made to circumvent this prohibition by a citizen assigning his claim to the State of his domicile, and by then having the suit brought in the name of the assignee State; but it was held that this could not be done, in New York *v.* Louisiana, 108 United States Reports, 76.

CHISTOPOL, chē'stŏ-pŏl'. See TSCHISTOPOL.

CHISWICK, chĭz'ĭk (sandy bay). A suburb of London, 7 miles west-southwest of St. Paul's, on the left bank of the Thames (Map: London, E 5). Around Chiswick are many fine villas, extensive market gardens for supplying London, and the gardens of the London Horticultural Society. The churchyard contains the grave of Hogarth, and both Fox and Canning died here. The Duke of Devonshire's beautiful villa, Chiswick House, is situated here. Pop., 1901, 29,901; 1911, 38,772.

CHITAL, chē'tăl, or **CHITRA,** chē'trà. The axis deer. See AXIS.

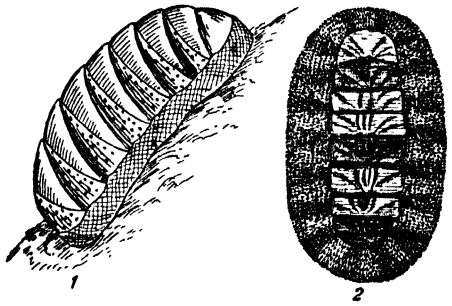
CHITARRONE, kē'tàr-rō'nâ. A bass guitar over 5 feet long, used in the orchestras of the seventeenth and eighteenth centuries. It had two sets of wire strings which were plucked with a plectrum. Its general construction is that of the theorbo (q.v.).

CHITIN, kī'tĭn (from Gk. χιτών, *chitōn*, tunic). The chief chemical constituent of the skeleton of insects and crustaceans. It differs from the horn substance by being insoluble in alkalies. It may be prepared from the body of articulata by extracting with dilute hydrochloric acid and alkali, then boiling with water, alcohol, and ether. Chitin is insoluble in dilute

acids and alkalies, but dissolves in strong hydrochloric, nitric, and sulphuric acids. When pure, it is a white, amorphous substance usually retaining the skeleton form. It is composed of carbon, hydrogen, nitrogen, and oxygen, as indicated by its "empirical" formula: $(C_{15}H_{26}N_2O_{10})_n$. But its molecular formula is unknown, nor is, consequently, anything known of its chemical constitution. (See CHEMISTRY.) Boiling concentrated acids transform it chiefly into glucosamine, $C_6H_{13}NO_5$.

CHITON, kī'tŏn (Lat., from Gk. χιτών, *chitōn*). In ancient Greece, a sort of shirt or undergarment, worn next the skin by both men and women. In Homeric times it was worn by men alone, the *peplos* being the women's underdress of this period. The Homeric chiton was a close-fitting garment of linen, which, being closed at the sides, was drawn on over the head, while the peplos was a long, loose woolen garment, open at one side and fastened with a brooch at the shoulder. In later times the chiton came into use for both sexes and was of two general forms. That of the men resembled the earlier Homeric chiton, being a short, close-fitting garment, sewed at the sides and provided with short sleeves or mere armholes; while that of the women, the so-called Ionic chiton, was long and loose, and was sewed at the sides and provided with sleeves. The earlier peplos, however, was still used, being especially favored by the Spartan women, whence it received the name of *Dorian*. Later still there came into use a sleeveless chiton for women. The chiton was sometimes worn girded and sometimes not, and it was of various colors and cuts. When one side of the chiton was unsewed, the girdle was regularly worn, so that the body was not left exposed. The length of the chiton could be adjusted at will, by the wearer pulling the skirt of the chiton up and letting part of it hang in a fold outside the girdle. Consult Amelung, in Pauly-Wissowa, *Realencyclopädie,* and Gulick, *The Life of the Ancient Greeks,* pp. 154–158 (New York, 1902). See COSTUME (Greek Section).

CHITON. A group of mollusks, the mail-shells, constituting an order (Placophora) in the class Amphineura. The shell is composed of eight narrow, transverse, calcareous pieces, overlapping each other in a row along the back,



CHITON, OR MAIL-SHELL.
1, attitude in life; 2, detail of shell and integument, dorsal view.

and strongly attached to the mantle, which is remarkably fleshy and fibrous. Chitons have the power of rolling themselves up into a ball like the armadillo (q.v.), thus exposing nothing but the hard shell. The organ of locomotion is an oval foot, extending the whole length of the animal, by means of which chitons cling to rocks so tenaciously that the heaviest surf does not disturb them. More than 200 species are known; they dwell in all climates, but are most abundant in the warmer seas. They occur at all depths, but prefer the rocks along the shore, where they sometimes are found in surprising numbers. All North Atlantic species are small, seldom an inch in length, but some of those found in the tropics and on the coast of California may be 8 or 10 inches long. Most of the chitons are gray or brown in color, but some species are very handsomely marked with red, orange, yellow, green, and other colors. The upper surface may be comparatively rough, with papillæ and spines. In most cases it is nearly covered by the shell plates, but in one or two genera the plates are very narrow and cover only the mid-dorsal part of the animal, while in still others the plates are completely concealed within the thickened integument. "West Indian negroes" are said to "eat the large chitons, which are abundant on their rocky coasts, cutting off and swallowing raw the fleshy foot, which they call beef."

Fossil Forms. The modern chitons are the survivors of a long line of ancestors that made their first appearance in the Ordovician or Lower Silurian rocks, attained some prominence during Carboniferous time, and, with a slight decline during the Tertiary period, have continued with only slight changes of scarcely more than generic rank down to the present era. The group thus affords an excellent example of the persistence of a generalized primitive type. The fossil genera are classified according to the form of the articulating facets of the valves and the proportions of the shell and its segments. See also PLACOPHORA.

CHITOR. See CHITTUR.

CHITRA. See AXIS.

CHITRALI, chē-trä'lē. The natives of Chitral, a region on the borders of British India, northeast of Kafiristan, on the southeastern slope of the Hindu-Kush. They belong, with the Kafirs (Siahposh), physically to the white race and linguistically to the Aryan stock. Their number is estimated at between 150,000 and 200,000. In the last years of the nineteenth century they came into conflict with the English authorities, and their ruler, with Mehtar, is now a British vassal. They are now adherents of Islam, but traces of their former Buddhism still exist. The chief language is known as Khowar. An interesting account of this people and their neighbors is given in Sir George Robertson, *Chitral* (London, 1898). Consult also Holdich, *The Indian Borderland* (London, 1901), and Anderson, *Peoples of India* (London, 1913).

CHIT'TAGONG' (corrupted from *Chatgoan*), or ISLAMABAD (city of Islam). A city in the Presidency of Bengal, India, capital and port of the district of the same name, situated on several small but steep hills on the Karnaphuli, 12 miles from its mouth, in lat. 22° 21′ N. and long. 91° 50′ E. (Map: Burma, B 2). An important commercial centre under the Portuguese, it came into possession of the British East India Company, with Bengal proper, in 1760–65. Originally a part of Arakan, it was claimed 60 years later by the Burmese Emperor, as a dependency of that territory—a claim which constituted one of the grounds of

the War of 1824. It is the seat of Chittagong College, churches, a general hospital; has shipbuilding industries and a considerable export trade in rice, jute, gunny, hides, and tea. Pop., 1901, 22,140; of district, 1901, 1,353,250; 1911, 1,508,433.

CHITTAGONG WOOD. The wood of *Chickrassia tabularis*, a tree of the family Cedrelaceæ, a native of the mountainous countries to the east of Bengal. In some parts of India it is called *cedar* or *bastard cedar;* names, however, which are also given to other kinds of wood. Chittagong wood is much valued in India and is used for all purposes for which mahogany is used in Great Britain. It makes beautiful and light furniture, but is apt to warp in very dry weather. Beautifully veined and mottled pieces are occasionally met with and are highly valued.

CHITTEM BARK. See CASCARA SAGRADA.

CHIT'TENDEN, FRANK HURLBUT (1858–). An American entomologist, born in Cleveland, Ohio. He was educated at Cornell University, edited *Entomologica Americana* in 1890, and became assistant entomologist in the United States Department of Agriculture in 1891. His publications, consisting of a large number of bulletins of the Department of Agriculture describing insect pests, include: *The Colorado Potato Beetle* (1907); *The Harlequin Squash Bug* (1908); *The Common Red Spider* (1909); *The Asparagus Miner* (1911); *The Broad-Bean Weevil* (1912); *The Potato-Tuber Moth* (1912); *The Spotted Beet Webworm* (1913).

CHITTENDEN, HIRAM MARTIN (1858–). An American soldier, born in western New York. After graduating from the United States Military Academy (1884), he rose through various grades to be lieutenant colonel of volunteers and chief engineer of the Fourth Army Corps in the Spanish-American War in 1898–99. He retired as brigadier general in 1910. He had charge of government works in Yellowstone National Park and on the Missouri, Ohio, and other western rivers. In 1911 he was appointed commissioner of the port of Seattle. He is author of *Yellowstone National Park, Historical and Descriptive* (1895; 6th ed., 1913); *Reservoirs in the Arid Regions* (1897); *Forests and Reservoirs in their Relation to Stream Flow* (1908); *War or Peace* (1911); *Report on the Water-Supply System of the Spring Valley Water Company* (1912).

CHITTENDEN, RUSSEL HENRY (1856–). An American physiological chemist. He was born in New Haven, Conn., Feb. 18, 1856, graduated at the Sheffield Scientific School of Yale University in 1875, became instructor in chemistry at Yale in 1876, studied in Heidelberg in 1878–79, and received his doctor's degree at Yale in 1880. He became professor of physiological chemistry at Yale in 1882 and director of the Sheffield Scientific School in 1898. From 1898 to 1903 he was lecturer on physiological chemistry at Columbia University, New York. From 1895 to 1904 he was president of the American Physiological Society and in 1907 president of the Society of Biological Chemistry. Dr. Chittenden has carried out several important researches in physiological chemistry, principally on questions pertaining to the chemistry of proteids and their primary cleavage products, and has made very valuable contributions to the knowledge of the process of nutrition. He is the author of an important work on *Digestive Proteolysis* and *Physiological Economy in Nutrition* (New York, 1905).

CHITTENDEN, THOMAS (1730–97). The first Governor of Vermont. He was born in East Guilford, Conn., but emigrated to the so-called New Hampshire Grants (now Vermont) in 1774. Here he took an active part in the controversy with New York and was a member of the convention which declared Vermont a State (1777) and of the State Constitutional Convention of 1778. He was Governor from 1778 to 1789 and again from 1790 to his death. His son Martin (1769–1841) was Governor in 1813–14. A Vermont county bears the family name, and the State erected a monument to the first Governor at Williston in 1896. Consult Chipman, *A Memoir* (Middlebury, 1849).

CHITTIM. See KITTIM.

CHITTUR, chĭt-tōōr', or **CHITOR.** A town in the State of Madras, India, 100 miles west of Madras (Map: India, B 4). Until 1908 it was the headquarters of the North Arcot district, but due to the prevalence of virulent fever they were removed to Vellose. A Roman Catholic chapel, an English church, a high school, and literary institutes are numbered among its institutions. Pop., 1901, 10,893; 1911, 15,108.

CHIT'TY, JOSEPH (1776–1841). An English lawyer and writer on law. He was a successful practitioner at the bar and enjoyed a great reputation for legal learning. His writings became the textbooks of the generation succeeding his own, their accuracy and systematic character rendering them peculiarly suitable for the purposes of law students. Among his principal works are: *Treatise on Parties to Actions and to Pleadings* (1808); *Treatise on the Law of Nations Relative to the Legal Effects of War on the Commerce of Belligerents and Neutrals and on Orders in Council in Licenses* (1812); *Treatise on Criminal Law* (1816); *Synopsis of Practice in the King's Bench and Common Pleas* (1831–32); *Treatise on Bills of Exchange and Promissory Notes* (1799); and an edition of *Blackstone's Commentaries* (1832).

CHIUN, kī'ŭn. A deity mentioned by the prophet Amos (v. 26), who reproaches the Israelites for having carried "the tabernacle of your Moloch [marg. better; Sicuth, your king], and Chiun, your images, the star of your God." The latter idol, Chiun, is now generally recognized to have the Babylonian name of the planet Saturn—*Kaiwan*, as the Syrians, Mandeans, and Persians called him. The assertion that there is an Egyptian god *Ken*, who may be identified with Chiun, is quite unfounded.

CHIUSI, kyōō'sē. A town of central Italy, in the Province of Siena, 37 miles southeast of Siena, with a population of 6000 (Map: Italy, F 4). It stands on an eminence in the Val di Chiana, near the lake of the same name. In ancient times, under the name of Clusium, it was one of the 12 cities of Etruria and the residence of Porsena (q.v.). When Italy was overrun by the barbarians, Chiusi fell into decay, the whole valley was depopulated, and became the pestilential pool described by Dante. Since the improvement of the course of the Chiana (q.v.), Chiusi has begun to flourish again. Necropolises round Chiusi have yielded a long series of objects, representing Etruscan products and imports from Greece. The earliest graves show no Greek wares and must reach well back into the eighth century B.C. Succeeding graves contain Greek

vases of the seventh century and from the beginning of the sixth century are found the chamber tombs, often richly decorated. Three thousand Etruscan inscriptions and 500 Latin inscriptions have been found in Clusium and its neighborhood; some are bilingual, and Latin inscriptions have been found beside Etruscan in the same cemeteries. The objects found in the graves are partly in the local museum and partly in Florence. Beneath the town is a series of underground passages which seems to belong to the old Etruscan system of drainage. Consult Dennis, *Cities and Cemeteries of Etruria*, vol. ii (rev. ed., London, 1907); L. Giometti, *Guida di Chiusi* (Poggibonsi, 1904).

CHIVALRY, shĭv'al-rĭ (Fr. *chevalerie*, horsemanship, knighthood, from *chevalier*, horseman, knight, from *cheval*, horse, from Lat. *caballus*, horse). In the Middle Ages the body of customs and ideals relating to the duties and privileges of knighthood. It owed its development partly to feudal usages, with which it had many relations, and partly to the Church, which adopted and altered the customs of chivalry to further its own control of society. Chivalry probably had its origin in the ancient Germanic custom of arming the youth solemnly in the presence of the warriors. Tacitus refers to this usage, and it seems to have prevailed throughout the early Middle Ages. The chronicles record that Louis the Pious, at the age of 13, received his arms from Charles the Great, and that Charles the Bald, at the age of 16, received his arms from Louis. The cavalry, after the middle of the eighth century, grew to be the most important part of the army, and as feudalism developed there was a tendency to fix the customs for the assumption of the arms and to define the duties of the knight. The last were to a great extent the regular duties of a vassal, which included bravery, fidelity, and loyalty. The conception of knightly honor, which grew up slowly, was comparatively late. The Crusades and the intense interest in religious matters in the twelfth century tended to make chivalry more Christian. It was held to be the knight's duty to defend Christianity, to protect the Church, and to battle against the infidel. Lanfranc Cigala, a little later, wrote: "I do not hold him to be a knight who does not go with a willing heart and all his might to the aid of the Lord, who has so great need of him."

According to the mediæval conception of chivalry, no one was born a knight. The candidate for the honor was sent, at the age of about seven, to act as page or valet in the household of some knight. There he obtained his education, and when old enough might become a squire. The duty of the squire was to attend the knight in battle or in tournament, to care for his horse and weapons, and to act as his aid. In time the squire might be made a knight. The distinction could be conferred in the earlier period by any knight; at a subsequent period the monarchs claimed the sole right to confer knighthood. The age when the squire became a knight varied; there are cases where the honor was conferred on boys of 10 or 11, but later it was usual to defer it until the age of 21 or later. In fact, some squires never became knights, in order to avoid the expense of the ceremony. In France, in the thirteenth century, a royal order punished with a fine noble squires who had not become knights by the time they were 24 years old.

The ceremony of admission into knighthood, known as "dubbing," usually took place on a festival, although squires were often made knights on the battlefield, in recognition of deeds of bravery. Occasionally before a battle took place the dignity was conferred upon a considerable number. The essential parts of the dubbing in the early twelfth century were the *collée*, or accolade, a blow upon the neck or shoulder, and the running *la quintaine*—i.e., tilting on horseback against a figure stuffed with straw. Later there was a symbolical and mystical development, which made the process of initiation mainly a religious ceremony. According to one ritual of the fifteenth century, the following were the details of the ceremony: after bathing, as a symbol of purity, the candidate "watched" his arms for a whole night before the altar of some church or the grave of some saint, and in the morning he confessed, often aloud, attended communion and mass, and listened to a sermon on the duties of purity, fidelity, honesty, the protection of the Church, widows, orphans, ladies, and all who were oppressed. A priest then blessed his sword and other pieces of armor; a knight made him take oath to fulfill all his duties; then the accolade, which consisted of three strokes with the sword, was given solemnly, and the following sentence uttered: "In the name of the Father, Son, and Holy Ghost, I make you knight." The knight who had given the accolade embraced the new knight, and girded him with his sword; the godfathers put on him the golden spurs, the symbol of knighthood; and the lords and ladies present assisted in clothing him with the other pieces of armor. Lastly, he mounted on horseback and ran *la quintaine*.

At the end of the twelfth century and later, chivalry was profoundly influenced by the popular romances of Arthur, Charlemagne, and other famous heroes. Manners became less brutal, and a spirit of knight-errantry grew up. It became the fashion to be rash, imprudent, and extravagant in conduct. The *Orlando* of Ariosto and *Don Quixote* have made the follies of declining chivalry familiar to all. Chivalry was at its best in the twelfth century, in the fourteenth was declining rapidly, and in the fifteenth was thoroughly decadent. Knight and squire gradually became mere titles of honor which might be hereditary. Consult: Gautier, *La chevalerie* (Paris, 1884); id., Eng. trans. by Firth (London, 1890); Sir Walter Scott, *Essay on Chivalry* (ib., 1868); and Stebbing, *History of Chivalry and the Crusades* (ib., 1830). See Feudalism; Knight; Orders; Bushido.

CHIVALRY, Court of, or Marshal's Court. An ancient military court of great dignity, which was formerly held by the Lord High Constable of England and the Earl Marshal. It had jurisdiction over civil matters affecting the naval establishments abroad and of all military matters and infractions of the martial law both within and without the kingdom. The extension of the jurisdiction of the common-law courts and the transfer of the jurisdiction over purely military offenses to modern courts-martial, instituted by parliamentary authority, has reduced the court of chivalry to a purely honorary position at the English court. During the seventeenth and eighteenth centuries it played the rôle of a court of honor (see Herald's College), but at the present time it has no legitimate function but that of "redressing en-

croachments and usurpations in matters of heraldry and coat armor." If in fact it should exercise this authority, the Earl Marshal alone would act as judge of the court, the office of Lord High Constable having fallen into abeyance. Consult the commentaries of Blackstone and Stephen.

Chivalry, Tenure in. The characteristic form of land tenure under the feudal system, the vassal, as tenant in chivalry, holding his land of his feudal lord on condition of military service. See FEUDALISM; KNIGHT'S SERVICE; TENURE.

CHIVASSO, kē-vȧs'sō. A city in the Province of Turin, north Italy, on the left bank of the Po, 18 miles northeast of Turin (Map: Italy, B 2). It markets grain and cattle. It was the residence of the dukes of Montferrat, and a stronghold until the fortifications were destroyed by the French in 1804. There are sulphur baths at San Genesio, 2 miles south. Pop., 1901, 9913; 1911, 10,084.

CHIVE, chīv, or **CIVE,** sīv (from Lat. *cepa,* onion) (*Allium schœnoprasum*). A plant of the same genus with the leek and onion (see ALLIUM), a perennial, ½ to 1 foot in height, with very small, flat, clustered bulbs, increasing by its bulbs so as to form a sort of tuft. The leaves are tubular, cylindrical tapering, radical, nearly as long as the most leafless flowering stem, which is terminated by a hemispherical, many-flowered umbel of bluish-red or flesh-colored flowers. The plant grows wild on the banks of rivers, and in marshy or occasionally flooded places in the middle latitudes of Europe and Asia, and on the northern borders of the United States. Chives are commonly cultivated in kitchen gardens, often as an edging for lots, and are used for flavoring soups and stews. Their properties are very similar to those of the onion. The part used is the young leaves, which bear repeated cutting during the season.

CHIVILCOY, chē'vēl-kō'ē. A town in the Province of Buenos Aires, Argentina, situated in a populous district 90 miles west by south of Buenos Aires (Map: Argentina, F 11). The inhabitants, among whom are many Italians and Basques, are engaged chiefly in agriculture and in the manufacture of brandy, ironware, and machinery. Pop., 15,000.

CHIVOT, shē'vō', HENRI (1830–97). A French writer of vaudevilles. He was born in Paris, where he brought out a large number of very successful vaudevilles, light comedies, and operettas, most of which were written with Alfred Duru (1829–89). Among these may be mentioned: *Le soldat malgré lui,* operetta in two acts, music by M. F. Barbier (1868); *Les cent vierges,* operetta in three acts, music by M. Lecocq (1872), libretto written in collaboration with Clairville; *Le pompon,* music by M. Lecocq (1876); *Madame Favart,* operetta in three acts, music by Offenbach (1879), of which 200 performances were given in Paris; *La mascotte,* comic opera, in three acts, music by Audran (1881); *La cigale et la fourmi,* music by Audran (1886); *La souris blanche* (1897).

CHLADNI, klȧd'nē, ERNST FLORENS FRIEDRICH (1756–1827). A German physicist. He was born in Wittenberg and studied law there and in Leipzig. He ultimately abandoned the legal profession in order to devote himself to physical science and, being acquainted with music, was led to observe that the laws of sound were by no means so well established as those of other branches of physics. He therefore began to apply his knowledge of mathematics and physics to acoustics and traveled for 10 years (after 1802) through Germany, Holland, France, Italy, Russia, and Denmark, giving a series of successful lectures on the subject. He discovered the longitudinal vibration of strings and rods and also produced the experiments since known by his name (see CHLADNI FIGURES), where the vibration of a plate is studied by means of sand figures. Using organ pipes, he was able to determine the velocity of sound in gases other than air and, in addition, was the inventor of many pieces of acoustic apparatus. Chladni's writings include *Entdeckungen über die Theorie des Klanges* (1787); *Akustik* (1802); *Neue Beitrage zur Akustik* (1817); *Beiträge zur praktischen Akustik und zur Lehre vom Instrumentenbau* (1822). Chladni also wrote several essays on meteoric stones. Consult: Bernhardt, *Dr. Ernst Chladni der Akustiker* (Wittenberg, 1856); Melde, *Chladnis Leben und Wirken* (Marburg, 1888); Kohlschütter, *Ernst Florens Friedrich Chladni* (Hamburg, 1897).

CHLADNI FIGURES. Figures produced by sand on a vibrating plate, forming designs more or less complex and depending upon the vibrations of the plate. This important experiment is due to Chladni (q.v.) and illustrates the formation of nodes and segments in a vibrating plate. The plate used in the experiment may be either metal or glass, and in shape may be a disk, a square, or any other form whose

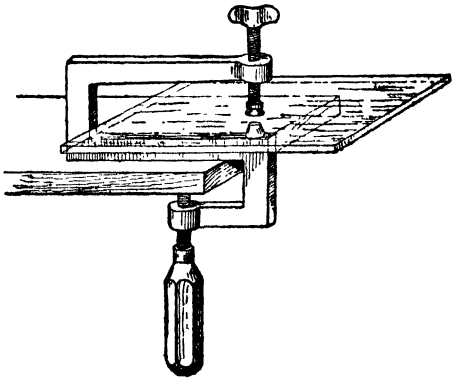


FIG. 1. CLAMP AND PLATE FOR CHLADNI EXPERIMENT.

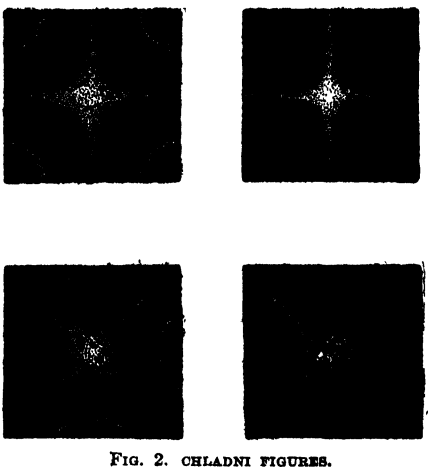


FIG. 2. CHLADNI FIGURES.

vibrations it is desired to study. The plate is clamped to a stand at its centre, and its edge is rubbed with a violin bow and set into vibration. The point where the plate is clamped will of course be a point of rest or node, while the part of the plate in contact with the bow executes the maximum vibration and will be a ventral segment. When sand is strewn on the plate, it will take a position along the nodes, being forced away from the points of vibrations to positions of rest. The figures formed by the sand take various forms, and indicate the vibration of the plate. A few of these figures, together with a plate clamped in position, are shown in the illustrations. The Chladni figures will be found described in most of the larger treatises on physics.

CHLAM'YDOPH'ORUS. See ARMADILLO.

CHLAMYDOSAURUS, klăm'ĭ-dō-są'rŭs. See FRILLED LIZARD.

CHLA'MYS (Lat., from Gk. χλαμύς). A form of cloak worn among the Greeks by huntsmen and horsemen, and the special garment of the Athenian ephebi. (See EPHEBUS.) It was straight on one edge, but circular on the other, with two long sidepieces, from which it was sometimes called the "Thessalian wings." It was gathered round the neck and was clasped over the right shoulder or the breast, in such way as to leave the right arm free. The loose ends were weighted with bits of lead or clay. At Athens it reached to the rider's waist, in colder climates to his feet. As the regular garb of the cavalry it appears in a manifold variety of adjustments on the frieze of the Parthenon. The material was usually wool, and it seems often to have been of bright colors.

CHLOAS'MA. A skin disease characterized by the appearance of spots or patches of discoloration which may be brownish, fawn colored, or yellowish. They are irregularly distributed and vary in size from a mere spot to a patch as large as the palm of the hand, or the color may be diffused all over the body. Chloasma is due both to local and systematic influences; chronic local irritation, pressure, blistering, or sunburn (producing freckles) being local causes. Examples of systemic affections producing discoloration of the skin are Addison's disease (q.v.), cancer, pregnancy, malaria, and liver disease. Chloasma appears on the face or any part of the body. The term is frequently but erroneously applied to patches of pigmentation on the chest (popularly called "liver spots"), due to *Tinea versicolor*, a parasite.

CHLOË, klō'ē (Lat., from Gk. χλόη, blooming, verdant). A pretty, sportive shepherdess in the Greek romance *Daphnis and Chloë*, by Longus (q.v.). She has become the stock idyllic heroine. The name and character appear in Sidney's *Arcadia*, in Fletcher's *Faithful Shepherdess*, in Prior's poems, and elsewhere. The Chloë in Jonson's *Poetaster* can hardly be described as bucolic.

CHLOPICKI, klō-pĭts'kĭ, JÓZEF (1771–1854). A Polish general and dictator of Poland during the revolution of 1830–31. He was born in Galicia, entered the army in 1787, and fought gallantly in the war for independence under Kosciuszko. After the surrender of Warsaw to the Russians, Nov. 8, 1794, Chlopicki went to France and joined the Army of the Cisalpine Republic, under General Dombrowski. In 1806, when Dombrowski and Wybicki called the Poles to arms, under the protection of Napoleon, Chlopicki returned to his country and fought gallantly at Eylau and Friedland (1807). From 1808 to 1811 he took part in the Spanish campaign. In 1812 he followed Napoleon to Russia, taking part in the bloody engagements at Smolensk and on the Moskva. After the remnants of the invading force had returned Chlopicki left the Imperial service on account of certain slights. After the taking of Paris by the allies in 1814, Emperor Alexander made him a general of division in the new Polish army, but he soon resigned, owing to the violent temper of the commander in chief, the Grand Duke Constantine. When the insurrection of the Poles broke out in 1830, Chlopicki, who foresaw the hopeless nature of the attempt, reluctantly obeyed the voice of the nation, which had conferred upon him the dignity of dictator (December 5). His moderate views and hesitating policy involved him in disputes with the patriot party, and on Jan. 23, 1831, he resigned his office; but to prove his sincerity, he entered the Polish army as a private soldier and took part as such in the battles of Waver and Grochow. After the suppression of the insurrection Chlopicki went to Cracow and withdrew altogether from public life. Consult Maczynski, *Life and Death of Joseph Chlopicki* (Cracow, 1858).

CHLO'RAL (from Gk. χλωρός, *chlōros*, greenish yellow), CCl_3CHO. A colorless oily liquid extensively used in medicine, in the form of its hydrate. It has a peculiar irritating smell and an acrid taste. Its specific gravity at 20° C. is 1.512. It is made on a large scale by the prolonged action of chlorine on ethyl alcohol; this yields first chloral alcoholate, which is then transformed into chloral by distilling with strong sulphuric acid at temperatures slightly below 100° C. When mixed with an equivalent quantity of water, chloral forms the hydrate $CCl_3CH(OH)_2$, which no longer contains the aldehyde group, CHO, contained in chloral.

Chloral hydrate is a colorless crystalline substance freely soluble in water and melting at 57° C. When distilled with sulphuric acid, it is retransformed into chloral. Alkalies transform chloral or its hydrate into chloroform. If taken internally, chloral acts as a powerful depressant, especially of the heart, causing a slow, feeble, irregular pulse. It acts directly on the brain and, if administered in medicinal doses, produces a refreshing and natural sleep. Frequent administration of chloral is, however, liable to cause chronic poisoning and may permanently affect the mind. In cases of poisoning from an overdose of chloral, the stomach should be washed out, sleep should be prevented by all means, and a strong coffee solution should be injected into the rectum. Chloral is often administered in tetanus, whooping cough, acute mania, delirium tremens, infantile convulsions, chorea, and other spasmodic affections; but it must always be given with caution on account of its depressant action on the heart. Locally chloral is an antiseptic and analgesic, being used for toothache, earache, and various neuralgic pains. It is also a useful sedative in itching skin diseases. Chloral was discovered by Liebig in 1832, and Liebreich in 1869 was the first to use it as an anæsthetic and hypnotic. *Chloralamide* and *chloralimide* are chemically allied to chloral, and have been used as substitutes for it.

CHLO'RALAM'IDE, and **CHLO'RALIM'IDE.** Substances used in medicine as substitutes for chloral (q.v.).

CHLORAL HY'DRATE. See CHLORAL.

CHLORAS'TROLITE (from Gk. χλωρός, *chlōros*, greenish yellow + ἄστρον, *astron*, star + λίθος, *lithos*, stone). A green, opaque, usually mottled and stellated variety of *prehnite* or *thomsonite*, that is found in amygdaloid trap rock on the Île Royale, Lake Superior. The mineral generally occurs in the form of rolled pebbles on the beach and takes a high polish, in consequence of which specimens are cut as gems and sold to tourists.

CHLOREN'CHYMA (Neo-Lat., from Gk. χλωρός, *chlōros*, greenish yellow + ἔγχυμα, *enchyma*, injection, from ἐγχεῖν, *enchein*, to pour in, from ἐν, *en*, in + χεῖν, *chein*, to pour). A collective name for the tissues which bear chlorophyll (q.v.), the characteristic green pigment of plants. See LEAF.

CHLO'RIC ACID (from Gk. χλωρός, *chlōros*, greenish yellow), $HClO_3$. A colorless liquid with a pungent odor, first obtained by Gay-Lussac in 1814. It is prepared by decomposing barium chlorate with dilute sulphuric acid. It rapidly bleaches vegetable colors and gives up its oxygen to organic bodies so rapidly that they take fire. With the metals chloric acid forms a series of salts called "chlorates." The most important of these is potassium chlorate, a white crystalline compound made on a large scale by passing chlorine gas into a hot solution of lime and adding potassium chloride. Potassium chlorate then separates out in the form of a mass of crystals and may be purified by recrystallization from water. Potassium chlorate is largely used as a source of oxygen gas. It also finds application in calico printing, in the manufacture of safety matches, in the production of fireworks, and as a detonator. Finally, it is employed medicinally in throat troubles, and it is especially valuable in the treatment of ulcerative stomatitis. Potassium chlorate was discovered by Berthollet in 1786 and is sometimes called "Berthollet's salt."

CHLO'RIC ETHER. A name formerly given to chloride of ethylene, or *Dutch liquid*, $C_2H_4Cl_2$. The name is now applied to spirits of chloroform, a mixture containing 6 per cent of chloroform and 94 per cent of alcohol; spirit of chloroform is often used in medicine as a flavoring agent.

CHLO'RIDES. See HYDROCHLORIC ACID.

CHLO'RIDIZING. A metallurgical term referring to the roasting of sulphide or complex silver ores with salt to convert the silver into a chloride which is soluble in hyposulphite solution or recoverable by amalgamation. This method of extraction is known as the Russell process and has been replaced by the cyanide process. See SILVER, *Metallurgy*. Consult Hoffman, *The Hydro-Metallurgy of Silver*.

CHLORIM'ETRY, or CHLOROM'ETRY (from Gk. χλωρός, *chlōros*, greenish yellow + μέτρον, *metron*, measure). The process of estimating the amount of chlorine in hypochlorites, as bleaching powder. The process depends upon the oxidizing power of chlorine. The laboratory methods usually employed consist in determining the amount of bleaching powder required in order to convert a known amount of arsenious acid into arsenic acid, or a known amount of ferrous salt into ferric salt; or else in determining the quantity of iodine which will be liberated by a given amount of bleaching powder from a standard solution of potassium iodide.

CHLO'RINA'TION. The conversion of gold contained in an ore into a soluble chloride by the addition of chlorine gas. In 1848 C. F. Plattner suggested that this method could be adopted on a large scale for the recovery of gold from ores. The method as developed is known as the chlorination process and was successfully used for many years in various parts of the world, though later it was replaced by the cyanide process. The chlorination process may be subdivided into two heads: the Plattner process, in which free chlorine gas is added to the ore, and the barrel process, in which chlorine is liberated in the ore from chemicals previously added. With the Plattner process the concentrates or residues are first subjected to a "dead" roast. The roasted ore is dampened and placed in tanks containing false bottoms through which chlorine, generated in another vessel, is introduced. After the ore becomes saturated with chlorine the tank is closed for about 24 hours, during which time the gold is converted into a soluble chloride. The soluble gold chloride is then leached from the ore with water and precipitated from the solution by the use of ferrous sulphate, sulphuretted hydrogen, or some other suitable reagent. The precipitated gold is then collected, melted, and cast into bars. The barrel process is also known as the Thies process, from improvements introduced by Adolph Thies about 1877. This process consists in charging the pulverized ore, together with a small percentage of bleaching powder, into a lead-lined barrel and adding from 40 to 60 per cent of water and the proper amount of sulphuric acid. The barrel is then closed and revolved until all of the gold is converted into a chloride. The recovery of the gold from the chloride is similar to the Plattner process. Many advantages were claimed for the barrel process, and it was used successfully in many gold mills throughout the world. This process has also been replaced by the cyanide process. Consult Rose, *The Metallurgy of Gold* (London, 1902).

CHLO'RINE (from Gk. χλωρός, *chlōros*, greenish yellow). A gaseous element discovered by Scheele in 1774. It was supposed by its discoverer to be hydrochloric acid deprived of phlogiston and was called by him "dephlogisticated marine acid gas." In 1785 Berthollet advanced the view that this gas should be regarded as a compound of hydrochloric acid with oxygen, and this view was universally maintained for nearly a quarter of a century. The error was first pointed out by Gay-Lussac and Thénard in 1809, and in the following year Davy demonstrated clearly the elementary nature of the gas, which he named "chlorine." It is never found free, but occurs extensively in the form of chlorides, as in the mineral halite, or rock salt, and in sea water; in sylvite (potassium chloride); in cerargyrite (silver chloride); also as alkaline chlorides in plants and animals. It may be readily prepared by the action of hydrochloric acid on manganese dioxide and purified by passing through water. Chlorine is employed as such in the manufacture of dyestuffs. It is largely transformed commercially into metallic chlorates and especially into bleaching powder (q.v.). It was formerly obtained by the wasteful Weldon process, i.e., by the action of manganese dioxide on the hydrochloric acid formed as a by-product in the manufacture of salt cake. (See SODA.) At present it is obtained partly by the electrolysis of common salt (see SODA) or of potassium chloride, partly

by the Deacon-Hasenclever process. The latter consists in first passing the hydrochloric-acid gas of the salt-cake manufacture into water, then expelling it by means of sulphuric acid, mixing it with air, heating the mixture to from 450° to 460° C. (842° to 860° F.), passing it at that temperature over brick fragments coated with cupric chloride, and freeing the resulting chlorine from unchanged hydrochloric acid by passing it through water. The cupric chloride itself unchanged (see CATALYSIS) acts as a "catalytic agent," causing the hydrochloric acid to give up its hydrogen to the oxygen of the air, the result being free chlorine and water.

Chlorine (symbol Cl; atomic weight 35.46) is a greenish-yellow gas with an irritating odor. It is readily liquefiable. Under normal atmospheric pressure the liquid boils at 33.6° below 0° C. Hence no compression beyond normal atmospheric pressure is needed to liquefy chlorine at —33.6° C. At 0° C. (freezing point of water) a pressure of 3.66 atmospheres is required. At 80° C., 28.4 atmospheres are required. The highest temperature point at which it is still possible to liquefy chlorine (i.e., its "critical point") is 146°, and at that point the necessary and sufficient pressure is 93.5 atmospheres (the critical pressure). Liquid chlorine is heavier than, and not miscible with water. Chlorine is a nonconductor of electricity and is exceedingly poisonous; it attacks the mucous membranes, causing much irritation, and if inhaled is capable of causing death. It dissolves in cold water, yielding a solution that resembles the gas in color, odor, and other properties. The solubility, curiously enough, increases up to 9° C., but diminishes again as the temperature rises. Chlorine finds important application in the arts as bleaching powder (q.v.), which is very extensively used in the cotton and paper industries. Its bleaching action is due to the readiness with which it combines, in the presence of water, with the hydrogen of the coloring matter. This avidity for the hydrogen of organic matter may be demonstrated by introducing a lighted taper into an atmosphere of chlorine—the taper will continue to burn, its hydrogen combining with the chlorine while its carbon is liberated in the form of soot. Chlorine is also a powerful disinfectant and deodorant and is much used for the destruction of the germs of infectious diseases. In chemical processes chlorine is frequently used as an oxidizer. Chlorine combines readily with basic radicles to form chlorides. Its most important compounds are described under SALT; BLEACHING POWDER; HYDROCHLORIC ACID; ETC. Consult Lunge, *Handbuch der Soda-Industrie und ihrer Nebenzweige*, vol. iii (Brunswick, 1896); also the authorities referred to under BLEACHING.

CHLO'RIS (Lat., from Gk. Χλωρίς). 1. The Greek goddess of flowers, identified with the Roman goddess Flora. 2. One of the daughters of the Theban Amphion and Niobe. She and her brother Amyclas, alone of the children of Niobe, escaped being slain by Apollo and Artemis. 3. The daughter of Amphion of Orchomenos and the mother of Nestor.

CHLO'RITES (from χλωρός, *chlōros*, greenish yellow). A group of minerals crystallizing in the monoclinic system and related to the micas. They are silicates of aluminum, magnesium, and ferrous iron—the latter constituent causing the characteristic green color—and also contain chemically combined water in varying proportions. The aluminum may be replaced partially by ferric iron. They occur as distinct crystals, or in the form of fibres and scales, which possess a well-marked cleavage. The chlorites are usually secondary minerals—i.e., they have been formed by the alteration of other magnesium silicates, such as garnet, amphibole, pyroxene, biotite, etc. This process of alteration, commonly called "chloritization," may be frequently observed among the older rock formations. (See CHLORITE SCHIST; METAMORPHISM.) In chemistry the name "chlorites" is applied to the salts of chlorous acid.

CHLORITE SCHIST, klō'rīt shĭst. A foliated rock containing more or less chlorite in parallel plates. Associated with the chlorite may be quartz and feldspar in considerable quantity, hornblende, talc, mica, iron ores, and a great variety of the rarer minerals. Chlorite varies in quantity from an exceedingly small amount to predominance. Chlorite schists are metamorphic rocks resulting from the alteration of igneous or sedimentary rocks of appropriate composition. The chlorite may result from such original minerals as biotite, amphibole, pyroxene, and garnet, and its presence is usually denoted by a green color as well as by a soft, somewhat greasy feel. See CHLORITES; METAMORPHISM.

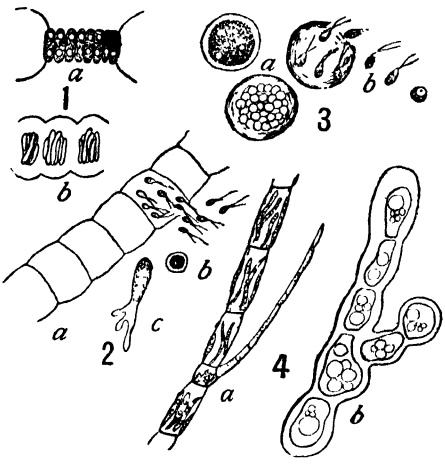
CHLO'ROFORM (from *chlorine* + *formyl*), or TRICHLOROMETHANE, $CHCl_3$. A colorless, heavy liquid having a sweetish, ethereal odor and burning taste. It does not mix with water, but dissolves freely in alcohol and ether. Its specific gravity at 15° C. is 1.498, and it boils at 61.20° C. It is an excellent solvent for a variety of substances, such as camphor, iodine, sulphur, phosphorus, resins, fats, alkaloids, etc. It is chiefly used, however, as an anæsthetic. It is formed by the direct action of chlorine on methane, or marsh gas, in sunlight; further, by the action of sodium or potassium hydroxide on chloral (q.v.). The method usually employed in making chloroform on a large scale consists in distilling from iron retorts a mixture of bleaching powder, water, and ethyl alcohol, or preferably acetone; the crude product of distillation is purified by shaking with strong sulphuric acid and redistilling. For anæsthetic purposes chloroform must be perfectly pure; and as by the action of light it is readily decomposed if kept in contact with moist air, bottles containing chloroform should be well stoppered and kept in the dark. Pure chloroform is not darkened by shaking with sulphuric acid; it should also contain no phosgene gas, which forms by the action of moist air on chloroform, and may cause bad aftereffects when the latter is employed as an anæsthetic. To prevent the formation of phosgene gas a small amount (0.6–1.0 per cent) of alcohol is added to chloroform. Attempts have been made to find a more efficient preservative of chloroform, but as yet without success: solid caustic potash, e.g., does more harm than good, its contact with chloroform resulting in decomposition, with steady evolution of carbon-monoxide (carbonic oxide) gas. The presence of chloroform in substances submitted for examination may be readily detected by the so-called carbylamine reaction; a small quantity of the substance is gently warmed with a mixture of aniline and an alcoholic solution of caustic potash, when, if chloroform is present, an intensely nauseous smell is observed, due to the formation of carbylamine (phenyl isocyanide). Preparations of chloroform are often used to mask the taste of nauseous medicines. Exter-

nally chloroform is irritant and if confined produces vesication. It is used as a liniment in chronic rheumatism, neuralgia, and chronic inflammations. The chances of danger from using chloroform as an anæsthetic are very small when it is skillfully given in properly selected cases: statistics show that no more than one death occurs in 3000 cases of administration of the substance. Ether, however, is even safer, and is in this country preferred to chloroform. If inhaled in small quantities, chloroform has the effect of abolishing the sensation of pain; for this purpose it is successfully employed in labor. It may also be inhaled to relax spasms in cases of tetanus, gallstone colic, or renal colic. As an anæsthetic, chloroform should be administered with the greatest caution, and ether is substituted for it if the patient suffers from heart disease. If anæsthesia be prolonged several hours, three stages may be distinguished: at first the highest functions of the organism are affected; confusion of the mind is accompanied in the patient by a pleasurable feeling throughout the body; general sensation is blunted, while the lower motor functions are powerfully excited, and the arms and legs are tossed about in a disorderly manner. This is followed (second stage) by general depression, and soon general anæsthesia sets in. The administration of chloroform is, however, carried on until the patient is partially narcotized and reflex excitability is completely abolished (third stage). During the administration of chloroform vomiting is very liable to occur. If dangerous symptoms appear, artificial respiration should at once be resorted to. Chloroform was discovered in 1831, independently by Samuel Guthrie at Sackett's Harbor, N. Y., by Liebig in Germany, and by Soubeiran in France. It was introduced as a general anæsthetic by Simpson, of Edinburgh, in 1848. Consult Baskerville and Hamor in *Journal of Industrial and Engineering Chemistry* for 1912.

CHLOROM'ETRY. See CHLORIMETRY.

CHLO'ROPHANE (from Gk. χλωρός, *chlōros*, greenish yellow + φαίνειν, *phaineın*, to appear). A variety of fluorite or fluor spar which emits a bright emerald-green light on a comparatively low rise of temperature, in consequence of which it has some value as a gem stone. Excellent specimens of this mineral are found in Trumbull, Conn., and also Amelia Courthouse, Va.

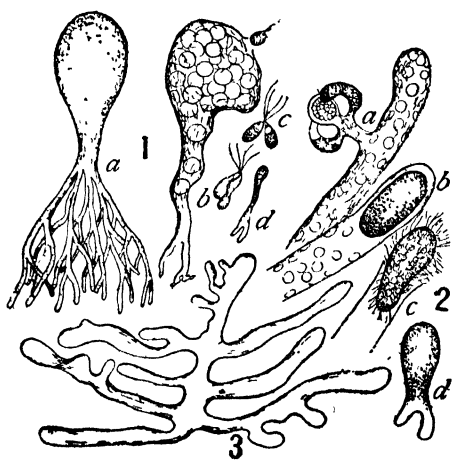
CHLO'ROPHY'CEÆ (Neo-Lat. nom. pl., from Gk. χλωρός, *chlōros*, greenish yellow + φῦκος, *phykos*, seaweed). One of four great groups of algæ, and commonly called the "green algæ." They usually contain no pigment in addition to the chlorophyll, so that the appearance of the group justifies the name. Chlorophyceæ are usually made to include six orders, but two of them at least are included for convenience rather than because they are closely related to the other groups. These six orders have been described partly in the article on ALGÆ. The group includes the simplest algæ, and these are generally supposed to be the forms from which the higher groups of plants have been derived. On this account green algæ may be regarded as the beginning of the present vegetation. The most primitive of the green algæ are the aquatic Volvocales, which are distinguished from all other green algæ by the fact that the vegetative cells have cilia and are therefore motile. By many they are regarded as animals. The forms of Volvocales range from isolated cells to complex spherical colonies. The Protococcales include a very heterogeneous assemblage of forms and are evidently closely related to the Volvocales. They occur mainly in fresh water and range from an extreme aquatic



CHLOROPHYCEÆ.

1, *Scenedesmus* (*a*), and its division (*b*); 2, *Ulothrix*, showing escaping spores (*a*), a resting spore (*b*), and its germination (*c*); 3, *Chlorosphæra*, showing resting stage (*a*) and formation of spores (*b*); 4, *Stigeoclonium*.

habitat to occurrence in moist places, such as tree trunks, shaded earth, etc. They differ from the Volvocales in the fact that the vegetative cells have no cilia and are therefore quiescent. Their range of form is also from a solitary cell to a complex colony, the water net being an extreme expression of colony formation. The most important assemblage of Chlorophyceæ is that called Confervales, which is also a very artificial assemblage, including aquatic and

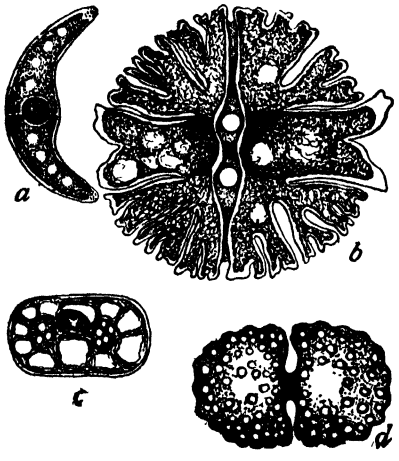


CHLOROPHYCEÆ.

1, *Botrydium* (*a*), showing formation of gametes (*b*), their fusion (*c*), and a young plant (*d*); 2, *Vaucheria*, showing sex organs (*a*), formation of large spore (*b*), its escape (*c*), and germination (*d*); 3, *Bryopsis*.

usually filamentous forms. All of them produce swimming spores and have worked out some form of sexual reproduction. The Confervales are supposed to represent the particular group of Chlorophyceæ from which the higher plants have been derived. The Siphonales represent a very

well-defined group, mostly marine, and characterized by having no cross-walls, the whole body, often quite complex, being one continuous cavity. The Conjugales are very distinct forms, and perhaps are not related, at least closely, to the other green algæ. They are characterized by the



CHLOROPHYCEÆ.
Desmids: *a*, Closterium; *b*, Micrasterias; *c*, *d*, Cosmarium.

absence of spores and by the peculiar method of sexual reproduction. It is in this group that the desmids occur, one-celled plants which are often extremely beautiful in form. In the same group is the well-known *Spirogyra*, with its very characteristic chloroplasts, which are spiral bands. The final group which is included under green algæ, simply on account of its pigment and not at all on account of its structure, is called Charales (q.v.).

There are many special monographs covering various orders in this large group. For general treatment, consult Engler and Prantl, *Die natürlichen Pflanzenfamilien* (Berlin, 1899 et seq.). See ALGÆ.

CHLOR'OPHYLL (Neo-Lat. *chlorophyllum*, from Gk. χλωρός, *chlōros*, greenish yellow + φύλλον, *phyllon*, leaf). The green coloring matter of ordinary foliage. This is not a single pigment, but a mixture of at least two—one a green pigment to which the name is sometimes restricted, and a yellow pigment, carotin (q.v.), or xanthophyll. Chlorophyll is also often associated with blue (phycocyanin), brown (phycophæin), or red (phycoërythrin) pigments, especially in the algæ showing these tints. Chlorophyll is only found associated with protoplasm, by which, indeed, it is produced. In some of the small plants it may color the whole protoplasm of the cell, but usually it is restricted to certain definite portions of the protoplasm called chloroplasts (q.v.). It is restricted to plants, though it is not found in all, being wanting in the whole class of fungi, and in some of the seed plants, especially those which live as parasites or saprophytes (q.v.). Chloroplasts have been said to occur in animals, but they turn out on examination to be minute green algæ, which live associated with the animal (e.g., hydra, sponges, certain radiolaria, etc.). The amount of chlorophyll in leaves, according to Tschirch, varies from 0.2 to 1 gram per square meter of surface. From the chloroplasts it may be extracted by various solvents, alcohol, ether, fatty and volatile oils, etc., but probably at once undergoes an alteration in its composition. In alcoholic solution it exhibits the property of fluorescence, being emerald green by transmitted light and deep blood red by reflected light. Molisch's test for chlorophyll is as follows: If a bit of dry tissue to be tested be wetted with a saturated watery solution of potassium hydrate, it instantly turns brown and after 15–30 minutes becomes again green. This change appears immediately on heating or adding water.

The chemical nature of chlorophyll has been discovered during the last five years. It is found to be a complex consisting of at least two green pigments, which are different oxidation stages of the same substance. These two pigments have been called α and β chlorophyllin. They have been crystallized, the form and structure of the crystals varying with the alcohol used. Chlorophyll is chemically related to hæmoglobin, the red coloring matter of the blood. It is found that, if the iron of the hæmatin molecule be replaced by magnesium, the result is chlorophyllin. The best account of the constitution of chlorophyll as shown by recent investigations will be found in Haas and Hill, *An Introduction to the Chemistry of Plant Products* (London, 1913).

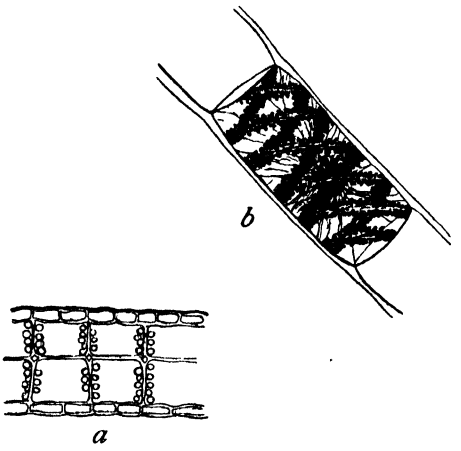
The coloring matters in a live leaf absorb certain wave lengths of light, notably λ 680–660 (between the B and C lines of the spectrum). There are also weaker absorption bands about λ 615–600, λ 560–540, λ 530–527 (nearly E line), and extensive absorption beyond λ 490. (See LIGHT, *Rectilinear Propagation.*) These absorbed portions are utilized in part for the making of food (see PHOTOSYNTHESIS); though the greater portion of the energy is dissipated in evaporating water. In the absence of chlorophyll, however, no formation of carbohydrate foods can occur. To this there are only unimportant exceptions.

Chlorophyll is formed usually only in the plastids which lie near the surface of a plant exposed to light of certain intensity. It is produced in darkness in certain exceptional plants, e.g., embryos of pines. It is only produced within certain limits of temperature and in the presence of oxygen. Probably under the normal conditions of life it is being continually formed and as continually destroyed. Intense light promotes its destruction, so that plants may become blanched thereby. Ordinary blanching (e.g., of celery) is accomplished by darkening, whereby the formation of chlorophyll is checked. See XANTHOPHYLL and CAROTIN.

CHLO'ROPLAST (from Gk. χλωρός, *chlōros*, greenish yellow + πλαστός, *plastos*, formed from πλάσσειν, *plassein*, to shape). In botany, the protoplasmic body found in green plants and distinguished by the green pigment chlorophyll. Chloroplasts are developed only in the cells to which a sufficient amount of light penetrates; therefore in the larger plants they are found only in the cells near the surface. The absorption of light by 6 to 10 cell layers is so complete that neither chlorophyll nor chloroplast is developed. Chloroplasts originate from preëxistent structures of the same kind. Unspecialized protoplasmic organs known as plastids (q.v.) multiply by direct division as the cells divide. Later those plastids in the superficial cells may differentiate into chloroplasts, which also may increase by direct division; those in storage organs may become leucoplasts (q.v.); or in

appropriate regions they may form chromoplasts (q.v.); or the chloroplasts may later be transformed into chromoplasts.

The form of chloroplasts is quite various in some of the algæ. In *Spirogyra* there are one to several chloroplasts in each cell. Each is ribbon-like, with an irregularly toothed edge, somewhat depressed and thicker along the median



CHLOROPLASTS.

a, *Lemna*, with chloroplasts against the vertical walls; *b*, *Spirogyra*, the two chloroplasts consisting of spiral bands.

line (thus troughlike) and spirally coiled in the protoplasm near to the cell wall. In *Mougeottia* the chloroplast is single and platelike, occupying the axis of the cell. In *Zygnema* there are two chloroplasts, each an irregular mass, with radiating arms reaching to the periphery. All these chloroplasts are peculiar in having one or more pyrenoids (q.v.) imbedded in them. In species of *Anthoceros* and *Sclaginella* each cell contains a single irregular chloroplast. But in most algæ and mosses and in all the higher plants the chloroplasts are several or many in each cell and have a somewhat flattened globoid or ovoid form.

The structure of the chloroplast, like that of other protoplasmic organs, is not definitely known; but it appears to be vacuolate, i.e., to consist of a firmer colorless portion inclosing many minute spaces filled with chlorophyll; but just how the latter is related to the colorless portion, and whether dissolved or not, is not satisfactorily determined.

The chloroplasts are capable of moving about the cell. When the protoplasm is rotating, the chloroplasts are swept along with it; but they are capable of independent creeping. When a leaf of sorrel, e.g., is exposed to diffuse light, the chloroplasts arrange themselves on the best illuminated sides (top and bottom) with their broad sides turned to the light. This position is known as epistrophe. In direct sunlight they pass to the side walls, standing edgewise to the light—a position known as light apostrophe. A somewhat similar position is assumed in prolonged darkness (dark apostrophe), the chloroplasts accumulating also on the bottom of the cell.

Photosynthesis depends wholly upon the chloroplast and its associated chlorophyll. The decolorized chloroplast is unable to form carbohydrates, and chlorophyll separated from the chloroplast is equally functionless. See ETIOLIN; PHOTOSYNTHESIS; MOVEMENT; PROTOPLASM.

CHLORO'SIS (Neo-Lat., from Gk. χλωρός, *chlōros*, greenish yellow). A peculiar form of anæmia, common in young women, and often associated with menstrual disorders. Constipation, tight lacing, mental anxiety, overwork, and faulty hygiene are factors in its production. In chlorosis the red blood corpuscles are not markedly reduced in number, but are pale, and their hæmoglobin content greatly lowered. It has been called the *green sickness*, from the greenish-yellow hue of the complexion in some patients. The disease is attended with great debility, with breathlessness, palpitation, and occasionally a perverted appetite. Chlorosis is curable in a large proportion of cases. The principal means to be employed are rest, fresh air, moderate exercise, a selected diet, proper clothing, iron, and arsenic. See ANÆMIA.

CHLOROSIS. A diseased state of plants, in which a sickly green or greenish-yellow color takes the place of the natural color. Sometimes only a particular shoot is affected by it, but very generally the whole plant; and it seems to depend upon causes which render the plant altogether unhealthy, the pallid appearance being merely symptomatic, and not only the formation of chlorophyll, but all the functions of vegetable life being languidly and imperfectly carried on. There seems to be considerable evidence that chlorosis is largely the result of malnutrition of the plant. Plants affected by this disease are often to be seen among crops generally healthy; but whole crops of grain, potatoes, etc., sometimes perish from it, or are much diminished in value. Fruit trees also suffer from it. Most investigators claim that chlorosis in plants is due to a superabundance of carbonate of lime in soils, although a lack of magnesia is also considered a contributing cause. Pineapples in Porto Rico became chlorotic when grown in soils containing more than 2 per cent calcium carbonate. The green color was restored by the use of iron sulphate as a fertilizer or sprayed on the leaves. A mixture of nitrate of potash, superphosphate, and iron sulphate may be used as a fertilizer with excellent results. In France grapes are subject to chlorosis to a great extent, and good results are reported to have followed washing the vines and fertilizing them in winter or early spring with an iron sulphate solution.

CHMEL, KMĚL, JOSEPH (1798–1858). An Austrian historian, born at Olmütz. He was appointed in 1846 vice director of state archives in Vienna. His works include *Die Handschriften der kaiserlich-königlichen Hofbibliothek zu Wien* (1840–41); *Geschichte Kaiser Friedrichs IV* (1840–43); and *Urkunden, Briefe und Aktenstücke zur Geschichte Maximilians I* (1845).

CHMIELNICKI, KMYĚL-NĬTS'KĚ, BOGDAN (1593–1657). The leader of the Cossacks in the great revolt against Poland in the middle of the seventeenth century. He belonged to a noble Polish family and was born in the Ukraine. By his courage and daring he won a high position among the Cossack tribesmen about the Dnieper. Oppressed by the Poles, the Cossacks rose in insurrection in 1648 under the leadership of Chmielnicki, who had been wrought up against the Poles by wrongs inflicted upon him. For a time Chmielnicki waged war victoriously, his followers committing the bloodiest excesses. At last, however, fortune forsook his standard,

and in 1654 he placed himself under the protection of the Czar of Russia, who, in return for the suzerainty thus obtained, guaranteed to the Cossacks their ancient rights and privileges. In 1873 an equestrian statue of Chmielnicki was unveiled at Kiev. For his life, consult Kostomarov (St. Petersburg, 1859).

CHMIELOWSKI, KMĔ-LŌF'SKĒ, PIOTR (1848–1904). A famous Polish writer. He was born in Podolia and was educated at Warsaw University and in Leipzig, where he subsequently received his Ph.D. In 1880 he began to lecture on the history of Polish literature at Warsaw University. These lectures were delivered in Polish, and when he was asked to substitute Russian for his native tongue, he preferred to abandon the course rather than comply with the request. Then he devoted himself to literary work with great zeal and success, showing in all he did a scholarly insight and a breadth of view but little known in Polish writers before his day. His many-sidedness is evidenced in the diversity of his interests, for he wrote on literature, pedagogy, art, and the lives of great men. Polish literature of the earlier nineteenth century claimed his particular attention, while he tirelessly combated the maxim of "art for art's sake" expounded by his contemporaries at home and abroad. From 1881 to 1897 he was editor of the *Ateneum*, a monthly literary review published at Warsaw. As author, editor, and translator, Chmielowski did very much to promote the culture of Poland.

Among his numerous works are: *Rousseau* (1878); *Goethe* (1878); *Liberalizm i obskurantyzm* (1882); *Autorkipolskie* (1885); *Adam Mickiewicz* (2 vols., 1886); *Jozef Ignacy Kraszewski* (1886); *Studja i szkice* (1886); *Nasza literatura dramatyczna* (1897); and *Estetyka Mickiewicza* (1898).

CHOATE, JOSEPH HODGES (1832–). A distinguished American lawyer and diplomat. He was born in Salem, Mass., and graduated at Harvard College in 1852 and at the Harvard Law School in 1854. He then practiced law for a year in Boston and afterward went to New York City, where he soon became remarkably successful as a lawyer. In 1884 he became a member of the legal firm of Evarts, Choate, and Beaman. As a trial lawyer he became widely known and after 1865 conducted many noteworthy cases before State, Federal, and international tribunals. Among them may be mentioned his successful defense of Gen. Fitz-John Porter, the Tweed Ring prosecution, the Tilden will contest, the Chinese exclusion cases, the cases in which he successfully contested the constitutionality of the Income Tax Law of 1894, and the Bering Sea dispute, in which he represented the Canadian government. Mr. Choate became a Republican in 1856, when he supported John C. Frémont, and in 1894 he was president of the New York State Constitutional Convention. He became an active opponent of machine government and in 1896 was defeated for the United States Senatorship by Thomas C. Platt. He was president of the American Bar Association in 1898–99. From 1899 to 1905 he was the Ambassador of the United States to Great Britain, serving in that capacity with distinction and notable personal popularity. He received the degree of D.C.L. from Oxford, and that of LL.D. from many foreign and American universities, and was made an honorary bencher of the Middle Temple. In 1907 he was first delegate of this country to the International Peace Conference at The Hague. Throughout his active life, and even after retirement from professional and official duties, he was much in demand as a speaker on public occasions; as an after-dinner speaker his fame was international.

CHOATE, RUFUS (1799–1859). One of the most famous of American lawyers. He was born in Ipswich, Mass., on Oct. 1, 1799. As a child he was remarkable for precocity, beginning to read while still almost an infant, and being able before his sixth year to repeat large portions of the Bible and of *Pilgrim's Progress*. In 1815 he entered Dartmouth College, where he soon attracted attention by his scholarly habits and unusual abilities and evinced an aptitude for classical and historical studies which characterized him through life. He graduated in 1819 as valedictorian of his class, was a tutor at Dartmouth during the following year, and then, under the inspiration of Webster's great speech in the Dartmouth College case, which he had heard in 1818, he took up the study of law, entering the Cambridge Law School in 1821 and subsequently removing to the office (in Washington) of William Wirt (q.v.), then Attorney-General of the United States. He returned to Massachusetts in 1822, continued his studies in Ipswich and Salem, was admitted to the bar in the following year, and began practice in Danvers. He married, in 1825, Miss Helen Olcott. He remained in Danvers until 1828, when he removed to Salem. In 1830 he entered Congress as a Whig, and immediately attracted general attention by a brilliant speech in favor of a protective tariff. He was reëlected in 1832, but resigned in 1834 before the expiration of his term, and opened an office in Boston, where he soon became the acknowledged leader, first of the local, then of the State, and finally of the New England bar. In 1841, Daniel Webster having become Secretary of State, Choate was elected to serve out his term in the United States Senate and represented Massachusetts until 1845, taking a conspicuous part in the debates on the Oregon boundary, the tariff, and the annexation of Texas. Weakened by overwork, he spent the summer of 1850 in Europe. In 1852, as a member of the Whig Convention in Baltimore, he led the faction which advocated the nomination of Webster, delivering on this occasion one of his most eloquent addresses; and in 1856, along with a section of the conservative Whigs, he supported Buchanan in opposition to Frémont. In 1859 his health failed him, and under the advice of his physician he sailed for Europe, but, feeling unable to complete the voyage, landed at Halifax, where in a few days—on July 13—he died. Throughout his life he was a thorough student, not only of law, but also of the classics, English literature, and history, reading with avidity and remembering everything that he read. His eloquence and remarkable facility in the use of the English language, his intuitive knowledge of human nature, and the acuteness and vigor of his intellect combined to make him preëminently successful as a lawyer, especially as a jury lawyer, and in the course of a long career he seldom lost a case. Consult: Brown, *Life of Rufus Choate* (Boston, 1870); *The Works of Rufus Choate, with a Memoir* (2 vols., Boston, 1862); *Addresses and Orations of Rufus Choate* (6th ed., Boston, 1891); Neilson, *Memories of Rufus Choate* (Boston, 1884); and Whipple, *Recollections of Eminent Men* (Boston, 1886).

CHOBI, chō'bē. A Bantu people in southeastern Africa, extending from the lower Limpopo to the sea. They are called Chobi on the river and Mindonga on the coast. They disfigure their faces with lumps raised by scarification.

CHOC'OLATE (Mex. *chocolatl*, from *choco*, coca, *latl*, water). A preparation made from the seeds of *Theobroma cacao*, a plant whose culture is restricted to an area bounded by 20° on either side of the equator. (See CACAO.) These seeds, after being removed from the pods, which are shelled and broken, are allowed to ferment and cure. The beans are then washed, dried, "finished," and polished for export. In the process of manufacture the beans are first graded, then roasted, cracked, nibbed, husked, and winnowed. They are then ground in a mill, and, if the fat or oil which constitutes not far from 50 per cent of good cacao beans must be removed for cocoa, the mass is then treated in a press, and the cocoa left after the fat is expressed is removed, allowed to cool, and crushed and powdered. Chocolate, which contains more of the fat, is taken direct from the grinding mill and is mixed with sugar or other materials as desired and then placed in molds, where it cools and hardens. Chocolate is used as a beverage and for this purpose is dissolved in hot water or milk. It is also much used as a confection and for this purpose is mixed with sugar, flavoring matters, and various other substances. The cacao tree, from which chocolate is made, flourishes in tropical regions, and the increase in the annual production and consumption of cacao beans practically doubled in the period 1903-13, amounting in 1911 to 550,000,000 pounds. The leading producers of that year were Ecuador, 88,660,000 pounds; Brazil, 86,000,000 pounds; Gold Coast, 77,000,000 pounds; St. Thomas, 73,000,000 pounds; Trinidad, 53,000,000 pounds; Dominican Republic, 214,000,000 pounds; and Venezuela, 40,000,000 pounds. The world's consumption in 1911 was stated as about 512,000,000 pounds, of which the approximate amounts taken by the leading countries were as follows: United States, 135,000,000 pounds; Germany, 110,000,000 pounds; France, 63,000,000 pounds; England, 56,200,000 pounds; Holland, 52,000,000 pounds; Switzerland, 22,700,000 pounds. In 1913 crude cacao, or cocoa, to the amount of 140,039,172 pounds, valued at $17,389,042, and 3,469,680 pounds of prepared cocoa and chocolate, exclusive of confectionery valued at $787,678, were imported into the United States. Chocolate was brought to Europe by the Spaniards, who learned its use from the Mexicans at the time of the invasion of Cortés in 1519. It was introduced into England about 1657. In the time of Charles II it was still a great luxury, costing 6s. 8d. per pound. In the United States chocolate was first manufactured at Milton Lower Mills, near Dorchester, Mass., in 1765.

Good chocolate is externally smooth, firm, and shining—not gritty in the fracture—easily soluble, and aromatic; not viscid after having been liquefied and cooled, but oily on the surface, and leaves no sediment of foreign substances. Chocolate is adulterated in many ways, by mixing it with rice meal, oatmeal, flour, potato starch, roasted hazelnuts, or almonds, and with benzoin, storax, etc., in place of vanilla.

Bibliography. Whymper, *Cocoa and Chocolate: Their Chemistry and Manufacture*, with bibliography (London, 1910); *Bulletins, United States Department of Agriculture*, Ewill, No. 13; No. 107 (1907); No. 32 (1910); Duval, *Confiserie moderne* (1908); Zipperer, *The Manufacturer of Chocolate* (New York, 1902). Also various volumes by manufacturers, such as Baker, *Cocoa and Chocolate* (Dorchester, 1904), and Historicus, *Cocoa and All about It* (London, 1880).

CHOCÓS, chō-kōz'. An Indian tribe, whose language constitutes a distinct stock, occupying the valley of the Río Atrato and the Pacific coast of Colombia between 4° and 8° N. lat. Consult Brinton, in *Proc. Amer. Philos. Soc.* for 1896 and 1897, and Rivet in *L'Année linguistique* (1908–10), vol. iv, pp. 123–126 (1912).

CHOC'TAW. An important Muskhogean confederacy, formerly occupying southern Mississippi and the adjacent parts of Alabama. They were sedentary and agricultural, slow and unwarlike in disposition, contrasting strongly with their cousins, the restless Chickasaw. Throughout the Colonial period they generally sided with the French, but were always doubtful allies. They flattened the head and had peculiar burial rites, the body being disinterred after a few days, when the bones were picked clean, by old men appointed for the purpose, and afterward preserved in their houses. About the close of the Revolution they began to drift westward into Louisiana. In 1830 they ceded all their remaining lands east of the Mississippi and removed to Oklahoma, where, under the style of the "Choctaw Nation," they maintained an autonomous form of government similar to that of the Cherokee (q.v.) until admitted to citizenship. There are now about 15,000 "citizens" in the nation, of whom perhaps two-thirds may be of pure or mixed Choctaw blood. There are also 1366 still remaining in Mississippi, Louisiana, and Alabama.

CHODAT, shō'dä', ROBERT (1865–). A Swiss botanist, born at Moutier-Grandval, Jura-Bernois, Switzerland. He was educated largely at Geneva University, where he became assistant professor (1889) and professor (1890) of systematic botany and (1900) professor of botany, and where he was dean of the faculty of sciences from 1898 to 1906 and rector of the university from 1908 to 1910. Besides some 200 articles in various journals of botany, his publications include: *Principes de botanique* (1907; 2d ed., 1911); *Sur le polymorphisme des Algues* (1908); *Aperçu de la géographie botanique du Paraguay* (1910).

CHODKIEWICZ, kōd'kē-ā'vĭch, JAN KAROL (1560–1621). A Polish general. He learned the science of war in the Spanish army, serving under Alva and Maurice of Nassau. On returning home he was made a lieutenant to Zolkiewski, and in this capacity he aided in crushing the Cossack uprising of Naleujko. He took part in the campaigns against Wallachia, in 1602 received command of the Polish army in Livonia, and in 1605 severely defeated Charles IX of Sweden near Kirchholm. For lack of adequate funds he was unable properly to follow up this victory, and in 1611 he concluded a truce with the Swedes. He was sent by Sigismund III to Russia to prosecute the war there in behalf of the Pseudo-Demetrius; but, hampered by the disorganization of his army, was compelled to relinquish Moscow and ultimately returned to Poland. He commanded in 1620–21 an army against the Turks, beating back an army of 160,000 trained veterans under Sultan Osman.

A few days after this victory (Sept. 24, 1621) he died of exhaustion in his camp. Consult the biography by Naruszewicz (new ed., Cracow, 1857–58).

CHODOWIECKI, kō'dō-vyĕts'kē, DANIEL NIKOLAUS (1726–1801). A German painter and engraver, born in Danzig, West Prussia. At first a merchant in Danzig and Berlin, he afterward studied painting in the latter city; was for a time a miniature painter, but was chiefly successful as an engraver. He was appointed director of the Academy of Arts in Berlin in 1797. He executed over 2000 engravings, of which the best are genre studies of everyday life. Admirable plates were prepared by him for Lessing's *Minna von Barnhelm*, Gellert's *Fabeln*, Schiller's *Räuber*, and German versions of *Don Quixote* and Goldsmith's *Vicar of Wakefield*. Most of his paintings are rather weak imitations of Watteau, but he is best in family groups, such as "The Departure of Jean Calas." The Berlin Museum contains two unimportant pictures in oil, and the Berlin Academy a number of wash and pen-and-ink drawings. Consult: Engelmann, *Chodowieckis sämtliche Kupferstiche* (Leipzig, 1857; supplement, 1860); Hirsch, *Nachträge zu Chodowieckis sämtliche Kupferstiche* (Leipzig, 1906); Meyer, *Chodowiecki, der Peintre-Graveur* (Berlin, 1887).

CHODZKO, kōdz'kō, LEONARD JAKOB (1800–71). A Polish historian, born at Oborek (Government of Vilna). After study at the University of Vilna he traveled with Prince Michael Cleophas Oginski, who had commanded a regiment in the insurrection of 1794. Having taken up residence in Paris, he received the appointment of adjutant to the Marquis de Lafayette for his activity in connection with the July Revolution (1830). During the insurrection of 1863–64 in Russian Poland he was agent at Paris of the revolutionary government. He wrote many historical works, most of them in French. These include *Observations sur la Pologne et les Polonais* (1827), designed as an introduction to Ozinski's *Mémoires sur la Pologne et les Polonais depuis 1788 à 1815* (2 vols., Paris, 1826); *Histoire populaire de la Pologne* (1835); *La Pologne historique, littéraire, monumentale, et pittoresque* (2 vols., 1835–37; 8th ed., 3 vols., 1854–57).

CHŒNIX, kē'nĭks (Lat., from Gk. *χοῖνιξ, choinix*). A Greek dry measure, varying in size under different standards. In Athens, according to the system introduced by Solon, it was equivalent to 4 cotylæ, 1.08 liters, 1.14 quarts. In the later Athenian system, established about 100 B.C., the cotyle was equivalent to 0.2047 liter, the chœnix to 6 cotylæ, 1.228 liters, 1.297 quarts. Consult Hultsch, *Metrologie der Griechen und Römer* (1882).

CHOËPHORI, kō-ĕf'ō-rī, THE. The second tragedy of the Orestean trilogy by Æschylus (q.v.).

CHŒRILUS, kē'rī-lŭs (Lat., from Gk. *Χοιρίλος, Choirilos*). An Athenian dramatist of the late sixth and early fifth centuries B.C., the rival of Pratinas, Phrynichus, and Æschylus. Tradition says that he was preëminent in satyric dramas. The lexicographers attribute to him 150 plays in all and report that he won 13 victories.

CHŒRILUS OF SAMOS (c.470 B.C.–). The author of an epic poem called the *Περσηΐς, Persēïs*, or *Περσικά, Persika*, descriptive of the Persian wars. He was, according to tradition, a friend of Herodotus and of Lysander the Spartan; he lived also at the court of Archelaüs (q.v.) of Macedonia. He was the first epic poet to choose his subject from contemporary history. His work received the honor of public recitation together with the poems of Homer, and was admitted to the Epic Canon, later to be ejected by the grammarians of Alexandria, in favor of that of Antimachus (q.v.). The fragments are included in Kinkel, *Epicorum Græcorum Fragmenta* (Leipzig, 1877). Consult also Müder, in *Klio* for 1907.

CHOG'SET. See CUNNER.

CHOIR, kwīr (older forms *quire, quier, queer;* modern spelling affected by Fr. *chœur*, Lat. *chorus*, from Gk. *χορός, choros*, whence the word is derived). Strictly speaking, the choir is the part of the church occupied by the singers, wherever that may be; but at different periods in church architecture it came to designate two distinct sections: (1) in early churches, the part midway between the upper end, or sanctuary, occupied by the higher clergy, and the lower end, or nave and aisles, occupied by the laity; (2) in mediæval and later churches, the entire upper or eastern end of the church, including high altar and apse, to which the singing had been transferred. The ritualistic sense, however, does not always agree with the architectural; for we speak of the choir of a cathedral, meaning the entire upper end beyond the transepts with its aisles or chapels, whether the singing is done there or not. In early basilican churches the upper end is called *apse*, and not choir, and the choir, as in San Clemente in Rome, is the space below the high altar, extending part way down the nave and slightly raised above its level, surrounded by a decorative parapet within which are marble benches for the singers, with a pulpit on each side and a paschal candlestick attached to the gospel pulpit (on the left side as one faces the high altar). This arrangement still persists in many Spanish cathedrals. This kind of choir is less a part of the architecture than of the ritualistic furniture and ornament. But, when monasticism gained complete control of church architecture in the eighth century, the old distinctions between higher and lower secular clergy no longer obtained, the division between choir and sanctuary lapsed, and the entire upper end became the choir. As the monks were numerous, and on the mediæval theory the worship of God was the primary consideration, the edification of the laity being secondary, the size of the choir increased, and the choir screen, shutting off the monks and the services from the laity in the lower part of the choir, was made lofty and heavy. Only when episcopal power returned and with it cathedral architecture and numerous lay congregations, in the eleventh and twelfth centuries, was this segregation of the choir partly broken down and some return made to early Christian custom. But the monastic custom of high choir screens was retained in many cathedrals, especially in England, where nave and choir are completely separated, attendants upon the services being usually seated within the latter. In England the term "chancel" (q.v.) is used to designate the upper end of churches without canons, e.g., parish churches. Ordinarily architects distinguish an apse from a choir in the sense of using the latter only when there is a considerable projection beyond the transept or nave. This projection often includes a cer-



CHOIR OF THE CATHEDRAL OF SAINT JOHN THE DIVINE, NEW YORK CITY

tain straight portion, as a continuation of the nave and aisles; then a semicircle with projecting choir chapels and choir aisles. An important feature of the architectural effect of the mediæval choirs was provided by the choir stalls, or sedilia. These are ranges of individual seats, sometimes in two or even three rows on either side of the choir, each higher than the one in front of it, those of the rearmost or highest row having an elaborate pinnacled canopy over each seat. The seats were pivoted to fold back while the choristers stood for the singing, with a carved projection (*miserere*) on the underside to relieve somewhat the strain of long standing. These choir stalls are superb examples of wood carving and inlay. For the æsthetic significance of the development of the choir in mediæval churches, the varieties of its form in different schools, see ARCHITECTURE. Choir is also the name given to the singers of the choral service.

CHOIR SCREEN, or **CHOIR WALL.** The screen or wall which divides the choir and presbytery from the nave and side aisles. When it bears a cross over the central entrance, it is sometimes called the rood screen. In the great monastic churches it was a solid wall with a single archway in the centre; but in many English cathedrals this has been replaced by a screen of open ironwork in modern times. Wooden screens are not uncommon in the smaller churches. The choir screens of the fourteenth and early fifteenth centuries in France are especially rich, as at Albi and Brou.

The term "choir wall," or "choir inclosure," is commonly applied to the screen wall separating the choir from the side aisles. Celebrated examples of this are those of the French cathedrals of Chartres and Amiens.

CHOISEUL-AMBOISE, shwä'zēl' ăN'bwäz', ETIENNE FRANÇOIS, DUC DE (1719–85). A French statesman. He fought bravely in the War of the Austrian Succession, but did not attain any prominence until later, when his attractive bearing and disposition won for him the favor of Madame de Pompadour, and as long as she lived his advancement was continuous and regular. He was made lieutenant general in 1748. In 1756 he was sent as Ambassador to Rome, where he adjusted with Pope Benedict XIV the dispute over the sacraments. In the same year he went to Vienna, intrusted with the mission of uniting Austria with France against Prussia. After accomplishing this he was made Minister of Foreign Affairs (1758) and created Duc de Choiseul (he had formerly been Count Stainville). He was the author of the *Pacte de famille*, which in 1761 brought about the alliance of all the Bourbon crowns against foreign aggression. His popularity with the court and the nation was increased when in 1763 he secured terms of peace for France, which, though humiliating, were far better than the French dared to hope for. His reputation was enhanced by his success in suppressing the Jesuits, whom Madame de Pompadour had come to hate no less than did the nation. His patroness died in 1764, but Choiseul continued to direct both the internal and external affairs of France. He was a skillful courtier and shrewd diplomatist and so controlled the intrigues of European courts that Catharine II of Russia gave him the name *le cocher de l'Europe* ('the coachman of Europe'). In 1768 he brought Corsica under French dominion. In 1770 Madame du Barry caused his dismissal. He lived magnificently in Chanteloup and (under Louis XVI) in Paris. He died May 7, 1785. Consult: *Mémoires de Choiseul* (2 vols., Paris, 1790); Boutry, *Choiseul à Rome* (ib., 1895); Broglie, *L'Alliance autrichienne* (ib., 1895).

CHOISEUL-GOUFFIER, gōō'fyā', MARIE GABRIEL AUGUSTE FLORENT, COMTE DE (1752–1817). A French diplomatist and archæologist. In 1776–82 he visited Greece and made a careful study of the whole country. His investigations resulted in the magnificent work *Voyage pittoresque de la Grèce* (2 vols., 1782–1822). He became a member of the French Academy in 1784 and two years later was sent as Ambassador to Constantinople, where he remained eight years. During the Revolution he adhered to the royal cause and afterward went to Russia, where he was made director of the Imperial libraries and of the Academy of Fine Arts. He returned to France in 1802 and under the Restoration was Minister of State. He was a lifelong friend of Talleyrand.

CHOISEUL-PRASLIN, -prā'lăN', EUGÈNE ANTOINE HORACE, COMTE DE (1837–). A French politician. He served in the navy from 1853 to 1865, held some minor offices, and in 1869 was elected to the Corps Législatif. In 1871 he was chosen to represent Seine-et-Marne in the National Assembly. He was elected to the Chamber in 1876, 1877, 1881, and 1889. From March to November, 1871, he was Minister Plenipotentiary of France to Italy and in 1880 was appointed Undersecretary of State in the Ministry for Foreign Affairs. In 1887 he was dispatched on a botanical mission to Ceylon and the United States. He was regarded as very influential in the Republican majority.

CHOISEUL (shwä'zēl') **-STAINVILLE,** CLAUDE ANTOINE GABRIEL, DUC DE (1760–1838). A French soldier and politician. He was a colonel of dragoons during the French Revolution and warmly supported the royal cause. He was one of those who arranged the flight of Louis XVI in 1791, but, after the royal party was captured, a price was set upon his head, and he was finally taken prisoner and confined at Dunkirk. He escaped, but was recaptured and condemned to death. He escaped, however, and at the Restoration received a seat in the House of Peers from Louis XVIII. In the Revolution of 1830 he was a member of the provisional government and afterward was appointed by Louis Philippe to the offices of governor of the Louvre and royal aid-de-camp. He wrote an account of the flight of the King (1822).

CHOISY-LE-ROI, shwä'zē'lə-rwä', or **CHOISY-SUR-SEINE,** sụr-sān'. A town in the Department of Seine, France, on the river Seine, 6 miles southeast of Paris (Map: Paris). It owes its importance to the pleasure château built here by Mlle. de Montpensier in 1682, which was acquired later by Louis XV as a residence. It was destroyed during the French Revolution. The church and the town hall were built in the reign of Louis XV. Among its monuments is a bronze statue of Rouget de l'Isle, author of the *Marseillaise*, who died here in 1836. The industries comprise textile, porcelain, glass, hat, and chemical factories. Pop. (commune), 1901, 11,281; 1911, 15,908.

CHOKEBORE. A shotgun (q.v.) whose bore is slightly narrowed towards the muzzle in order to concentrate the shot.

CHOKECHERRY (so called on account of its astringent fruit). A name given to those

species of the genus *Prunus* of which the fruit is astringent. They are comprised in the section *Padus* of the genus *Prunus;* they are natives of North America and have small fruit that hangs in racemes. The true chokecherry is *Prunus virginiana,* which is a shrub or small tree. Closely allied to it is the wild black cherry, *Prunus serotina.* This is an important forest tree, 60 feet high, and ranging over the United States from Maine to Florida and west to the Dakotas and Texas. It is a handsome tree, and its wood is one of the most valuable of American woods for cabinetwork. It has a considerable resemblance to the Portugal laurel, although the leaves are deciduous. The bark is used as a febrifuge, pectoral, and tonic, under the name of wild-cherry bark; and by distilling it with water, a volatile oil is obtained from it associated with hydrocyanic acid, called oil of wild cherry. This bark allays nervous irritation and is particularly suitable as a tonic. See WILD CHERRY.

CHOKE DAMP. See CARBONIC-ACID GAS.

CHOKED DISK. See OPTIC NEURITIS.

CHOKING. See LARYNGOTOMY; TRACHEOTOMY.

CHOLAGOGUE, kōl'à-gōg (Gk. χολαγωγός, *cholagōgos,* from χολή, *cholē,* bile + ἀγωγός, *agōgos,* bringing, from ἄγειν, *agein,* to carry). An old term for a cathartic medicine which increases the flow of bile. The most reliable are calomel, phosphate of soda, and podophyllum. Cholagogues act either by promoting the secretion of bile or by facilitating the flow of bile from the gall bladder into the duodenum. See PURGATIVES.

CHOL'ELITHI'ASIS. See CALCULUS, or STONE.

CHOLERA, kōl'ê-rà (Lat., from Gk. χολέρα, *cholera,* the cholera, from χολή, *cholē,* gall bile). A term applied to four different diseases known respectively as *cholera morbus, cholera nostras, cholera Asiatica,* and *cholera infantum.* An account of the last-named disease is given in a special article. The others may be briefly described in the present sketch.

Cholera Morbus. This is a rarely serious attack of gastroenteritis, characterized by vomiting, diarrhœa, cold surface, cramps in the abdomen, and some prostration. It is caused by eating indigestibles or overloading the stomach, by excessive drinking of ice water, exertion or exposure immediately after eating, etc., and usually occurs in the summer. In adults the treatment consists in emptying the digestive tract, then giving opium and carminatives, and resting the alimentary canal for several hours.

Cholera Nostras. This is an intense form of acute enteritis, which has appeared in various parts of Europe, sometimes in epidemic form, since the days of Hippocrates. The name was adopted after Asiatic cholera appeared and invaded Europe, to distinguish it from the latter disease. Cholera nostras is brought on by similar causes, and resembles cholera morbus except that the invasion is less sudden, the pains are more severe, and the prostration is more pronounced. Cramps occur in the legs, fingers, and arms, the skin becomes blue, and delirium or convulsions occur. Death is rare except among the aged, children, and invalids. No one cause can be named for it. The ordinary and normal intestinal bacteria (*Bacillus coli communis*) have been found in the fæces, but not the spirilla. The disease is not frequent in the United States, unless it be considered identical with the severer forms of cholera morbus. The term is but rarely used by American physicians. During an epidemic of true cholera it is difficult to differentiate cases of cholera nostras, except by the absence of the spirilla in the dejections. In treating cholera nostras the digestive tract should be emptied by washing out the stomach and by using purgatives; the rectum should be irrigated with large quantities of hot tannin solution; the patient should take a hot bath and be warmly covered; the heart should be supported by proper medication. The attack may last several days and is usually followed by considerable weakness and digestive disturbances.

Asiatic Cholera. This is an infectious disease caused by drinking water or food contaminated by the fæces of other cholera patients and containing a flagellated vibrio, the *Spirillum choleræ.* It is probably never communicated by contagion, i.e., through the breath, perspiration, or other emanation from the patient. The disease originated in India, where it is endemic. The earliest-known account of the disease is probably that of Sueruta, a Hindu physician. Its permanent home is Calcutta and the southern part of Bengal. It has existed since 1817 in endemic form, and epidemics of it antedate the Christian era. Cholera first appeared in China in 1820; in Arabia, Persia, and Mesopotamia in 1821; in Syria, Palestine, and on the shores of the Caspian in 1823. The second epidemic, starting from the Ganges in 1826, passed through Persia and Astrakhan to Russia in 1830 and to Poland in 1831. Meanwhile it extended through Mesopotamia, Arabia, Palestine, and Egypt, and from Russia it passed into Germany. After invading Austria, Hungary, Wallachia, and Turkey, it reached England in 1831. Brought by Irish immigrants to Quebec in 1832, it entered the United States by way of Detroit, Mich., and thence it spread through the West to the Pacific coast and south to New Orleans. Subsequent epidemics occurred in 1841, 1863, 1871, 1883, 1891, and 1893. The disease prevailed in America in 1848 and 1852 and from 1865 to 1868. It appeared in New Orleans and the valley of the Mississippi River in 1873, and in 1892 a few cases came to the port of New York from Hamburg, Germany. In 1899 it was found by the United States troops in the Philippine Islands, where it has probably been often prevalent.

Most cases of cholera begin with nausea, restlessness, and chilly sensations, followed by violent and frequently recurring diarrhœa, with vomiting and vertigo. In from one to six hours buzzing in the ears, palpitation of the heart, pressure over the stomach, an anxious gray face, and blueness of the whole surface supervene. The bowels are emptied, painlessly, of discharges resembling rice water. Pain in the stomach and in the region of the heart is often severe, and cramps occur in the calves and arms. The patient suffers continually from thirst. The external temperature is subnormal, being about 95° F., or lower, while the rectal temperature may be 103° or 104° F. The pulse rarely exceeds 100, while the respiration is usually increased to 30 or 40. Urine may be suppressed. The patient may sink into a somnolent and then a comatose condition and die, or else he may suddenly improve, and then either go on to convalescence or sink into fatal coma in a

few days. Of the mild cases, about 50 per cent die; while of those with subnormal temperature, cyanosis, and coma, 90 per cent die. A mild form of true Asiatic cholera, known as *cholerine*, is rarely fatal, but is dangerously infectious. Lobar or lobular pneumonia, enteritis, nephritis, and neurasthenia may follow cholera.

Asiatic cholera is due to a slightly curved bacillus which, from its shape, is called the comma bacillus (*Spirillum choleræ Asiaticæ*). The bacillus, discovered by Koch in 1883, is a short motile rod from 1 to 2 micromillimeters long. A number of such bacilli are often found clinging to one another at their ends and thus forming spirals of various lengths. The bacillus grows in the presence of oxygen and does not produce spores, the temperature best adapted to its growth being about that of the human body. It is, however, quite resistant to cold, though it is readily destroyed by drying or boiling. Its definite biological characteristics usually enable an expert to determine its pressure or absence in intestinal evacuation early in the disease. The bacilli are usually confined to the intestines, and during the active stages of the disease may be present in enormous numbers. The systemic effects seem to be due to absorption of toxins produced by the bacilli and are of the nature of a toxæmia. The pathological changes are not characteristic, and an autopsy shows those degenerative changes which usually accompany acute infection. In the small intestines, where the bacteria are present in greatest abundance, there are apt to be hemorrhages into the mucous membrane and intense congestion. The lymph follicles of the intestines are swollen and congested. The contents of the intestines may either consist of the typical rice-water fluid or else may be dark colored and bloody.

Patients suffering from cholera should be thoroughly isolated. Suspicious cases, also, should be isolated as soon as possible, and their dejections subjected to bacteriological examination. The vessels receiving the dejecta should contain a 5 per cent solution of carbolic acid and should be cleansed with boiling water after being used. The bedding and clothing of the patient should be disinfected by steam or soaked for one hour in a 5 per cent solution of carbolic acid. The room used should be scrubbed with a similar solution, and all loose articles either burned or sterilized by steam or by formaldehyde vapor. Bodies of the dead should be promptly wrapped in a close sheet saturated with bichloride of mercury or carbolic-acid solution and buried at once. Nurses, physicians, and undertakers should disinfect their hands, faces, and clothes with the greatest care. According to a rule adopted in the United States and in Germany, all persons arriving from infected districts are quarantined five days; if cases of cholera have broken out among them, the quarantine must be extended a week longer. As further preventive measures in time of danger, all water used for drinking or for washing tableware should be boiled, and all fruit, ice, and milk should be carefully inspected.

The treatment of cholera consists in supporting the patient by opium, astringents, stimulants, heat, etc. Some success has followed flushing the rectum with salt solution, and subcutaneous injections of the same. The immense losses of fluid from the body engender an intense thirst and concentrate the toxins; therefore the patient should be given a liberal supply of water by mouth. Anticholera inoculation has been used with considerable success, according to Haffkine's method. Artificial immunization is secured by subcutaneous injection of cultures of diminished virulence followed by injections of cultures of increased virulence. Forsyth reports on the use of Haffkine's serum in 1903 that no ill effect followed 30,609 inoculations. Of these 329 were attacked by cholera, of whom 15.1 per cent died. The uninoculated suffered a mortality of 45.2 per cent. Others report 40 per cent mortality among the inoculated who subsequently contracted cholera, and 75 per cent among uninoculated cholera patients. See SERUM THERAPY. Consult Wendt, *Treatise on Cholera* (New York, 1898).

CHOLERA INFANTUM (Lat., the cholera of children). A fatal form of diarrhœa, of infectious origin, occurring in infants and young children, especially in the summer months. The *Bacillus dysenteriæ* of Shiga is believed to be the specific infectious agent, but it is not always found in the stools. Attacks are caused by the ingestion of impure milk or other foods and are generally precipitated by chilling of the abdomen, the child lying uncovered during a cool night following a hot day. The onset of the disease is sudden, with great prostration, a rise of temperature to 103°–105° F., almost constant vomiting of food, mucus, and bilious material; 12 to 15 passages from the bowels each day, first of green, yellow, or brownish color, later of colorless serum, in most cases odorless, in some few instances overpoweringly offensive; rapid emaciation and loss of weight; depressed anterior fontanelle, sunken eyes, sharp features, a peculiar pallor, and an anxious expression; nervous irritation and moaning or crying; dullness, rarely delirium. The disease is fatal in two-thirds of the cases, and almost all cases occur in bottle-fed children of the poor during the first or second summer of their lives. In institutions the mortality is sometimes as high as 90 per cent. In such a fatal disease preventive treatment is most important. Strict attention to the preparation and keeping of milk is the chief consideration. During the summer months the milk should be pasteurized, or certified milk should be used; the enforcement of municipal milk inspection in many large cities has reduced the death rate from summer diarrhœa to a minimum. The child should be protected by suitable clothing from chilling of the abdomen at night. Treatment, when the attack is established, varies in individual cases, but the general indications are in the beginning to empty the bowels of infectious material by purgatives, such as calomel or castor oil, or by enemas; to withhold all food for 24 hours, meanwhile giving plenty of water to combat emaciation and relieve thirst, and following that by rice, barley, or albumen water, and a gradual return to the normal food. Small doses of brandy constitute the best stimulant. If the diarrhœa persists, opium, bismuth, or chalk mixture is useful. The term "cholera infantum" is also sometimes used, inaptly, as a synonym for gastroenteritis (q.v.). Consult Holt, *Diseases of Infancy and Childhood* (New York, 1904).

CHOL'ERINE. See CHOLERA, *Asiatic*.

CHOLESTERIN, kō-lĕs'tĕr-ĭn (from Gk. χολή, *cholē*, bile + στερεός, *stereos*, solid), $C_{26}H_{43}OH.H_2O$. A white crystalline substance occurring as a normal constituent in cell protoplasm. It

is therefore widely disseminated in both the animal and vegetable kingdoms. It is found in considerable quantities in the nerves and the white matter of the cerebro-spinal axis, and also occurs in milk, in the blood, and the bile, and is the main constituent of gallstones, from which it may be readily prepared by extracting with boiling water and dissolving in hot alcohol. On cooling, the alcoholic solution thus obtained deposits cholesterin in somewhat impure form; the substance is then purified by recrystallization from alcohol. Cholesterin crystallizes in glittering nacreous scales, melting at 148.5° C.; it may be distilled in vacuo, without decomposition, at temperatures above 360° C. Chemically it is a monatomic alcohol. When its solution in chloroform is shaken with strong sulphuric acid, the solution assumes a blood-red coloration, which gradually changes to blue, green, and finally yellow. Cholesterin is insoluble in water. An alcohol of the same molecular formula as cholesterin, called "phytosterin," or "plant cholesterin," is widely distributed in the vegetable kingdom and may be readily obtained by extracting peas with ligzoin, filtering, evaporating the filtrate to dryness, and recrystallizing the residue from alcohol. With chloroform and sulphuric acid phytosterin shows the same reaction as cholesterin. Phytosterin melts at 133° C. Both cholesterin and phytosterin are optically active, both turning the plane of polarized light to the left, though not to the same extent.

CHOLET, shō'lā'. A town of France, in the Department of Maine-et-Loire, on the right bank of the Maine, 37 miles southwest of Angers (Map: France, N., E 5). It has manufactures of linen, cotton, and woolen goods, including batiste and flannel, which industries in this and the surrounding territory employ between 50,000 and 60,000 operatives. There is a brisk trade in lumber, grain, and cattle. Granite is quarried near by. The first considerable growth of the town was when a colony of weavers settled here under Edouard Colbert, Count of Malévrier. Pop. of commune, 1901, 15,335; 1911, 21,058. Here, during the Vendean War, two actions were fought in 1793, in both of which the Royalists were decisively defeated.

CHOLIAMB, kō'lī-ăm'b. See VERSIFICATION.

CHOLMONDELEY, chŭm'lĭ, MARY (?–). An English novelist, born at Hodnet, near Condover in Shropshire, daughter of the rector there. In 1896 her father's health broke down, and the family removed to London. Her novels comprise, notably: *The Danvers Jewels*, under the pen name of "Pax" (1887); its sequel, *Sir Charles Danvers* (1889); *Diana Tempest*, the first novel to appear under her name (1893); *The Devotee* (1897); *Red Pottage* (1899); *Moth and Rust* (1902); *Notwithstanding* (1913). Beginning with a detective story, Miss Cholmondeley has worked her way into the novel of contemporary life. She possesses humor and pathos and usually keeps a firm hold on her characters; but a tendency to melodrama prevents her work, in spite of its popularity, from being wholly admirable.

CHOLÓNES, chō-lō'nāz. An Indian tribe, whose language constitutes an independent stock, occupying a limited area on the left bank of the Huallagá, between 8° and 9° 30′ S. lat., in central Peru. The language of the Hibitos is said to belong to the Cholonan stock. Consult Brinton, "The Cholona Language," in his *Studies in South American Native Languages*, pp. 30–36 (Philadelphia, 1892), and Chamberlain, in *Journ. de la Soc. des Amér. de Paris*, N. S., vol. vii, pp. 185–186 (1910).

CHOLULA, chō-lōō'lȧ. An old town of Mexico, in the State of Puebla, situated at an altitude of nearly 7000 feet, about 8 miles west by north of Puebla, with which it is connected by rail (Map: Mexico, K 8). It is well built and contains a pyramid of clay and brick supposed to have been built by the aborigines in honor of one of their deities and surmounted by a half-ruined chapel, probably erected by Cortés. Cholula, at the time of Cortés, was a flourishing city of 20,000 houses and a large number of temples. It was the chief city of a semi-independent state settled by a tribe of the Nahuatl race. The inhabitants carried on a considerable trade and had a more or less democratic form of government. It was visited by Cortés in 1519, and in spite of his friendly reception by the inhabitants, he massacred a number of them, suspecting them of plotting against the Spaniards. The population of Cholula is about 9000.

CHONCHO. See CHUNCHO.

CHON'DRODITE. See HUMITE GROUP.

CHONDROPTERYGII, kŏn-drŏp'tĕr-ĭj'ĭ-ī (Neo-Lat. nom. pl., from Gk. χόνδρος, *chondros*, cartilage + πτερύγιον, *pteryglon*, fin), or ELASMOBRANCHII. A group of cartilaginous fishes, including the sharks, rays, and chimæra. See FISH.

CHONDROSTEI, kŏn-drŏs'tē-ī (Neo-Lat., from Gk. χόνδρος, *chondros*, cartilage + ὀστέον, *osteon*, bone). An order of fishes within the group Teleostomi, which includes the sturgeons and closely allied forms. See STURGEON.

CHONDROSTEUS, kŏn-drŏs'tē-ŭs. A Jurassic fossil fish, the direct ancestor of the modern sturgeon, found in the Liassic beds of England. The form of the body is very similar to that of the sturgeon, and the skeleton differs only in the form and arrangements of the cranial bones and in the presence of a series of branchiostegal rays, which latter character is reminiscent of the Palæoniscidæ. The body was free from scales, except on the upper edge of the caudal fin, where thick rhombic scales like those of the sturgeon were present. The type species, *Chondrosteus acipenseroides*, was only 3 feet in length. Another species was about 6 feet long; and an associated genus, *Gyrosteus*, is known only by fragments that indicate for it a length of 20 to 25 feet. See STURGEON.

CHONEK, or TSONEKA, TZONEKA. See TSONEKAN (TEHUELCHEAN).

CHONETES, kŏ-nē'tēz (Neo-Lat. nom. pl., from Gk. χώνη, *chōnē*, χοάνη, *choanē*, funnel, from χεῖν, *chein*, to pour). A genus of fossil Brachiopoda, of the order Protremata, which may be recognized by the semicircular outline of the much-compressed concavo-convex shell, and by the row of hollow spines on the upper margin of the hinge area of the ventral valve. The outer surface of the shell is ornamented by radiating striations in most of the species, while in some Carboniferous species there is also a mesial fold and sinus. The species are mostly small, seldom exceeding an inch in transverse diameter. In America the genus appears first in the Silurian rocks, it attains its maximum evolution in the Devonian and Carboniferous, and it became extinct with the close of the Permian; thus it is a valuable index fossil for the Upper Paleozoic rocks. About 60 American species are known, and there is probably an equal number known

from Europe and Asia. See BRACHIOPODA; DEVONIAN SYSTEM; CARBONIFEROUS SYSTEM.

CHONODENDRON, kō'nō-dĕn'drŏn. See CISSAMPELOS.

CHONOS, chō'nŏs. A tribe of Indians, now extinct, who formerly occupied the Archipelago of Chonos and the adjacent regions of the Chilean coast, from about 45° to 52° S. lat. Their language, apparently, formed a distinct stock. Consult Chamberlain, on the Chonoan stock, in *American Anthropologist*, N. S., vol. xiii, pp. 467–468 (1911).

CHONOS ARCHIPELAGO, chō'nŏs är'kĭ-pĕl'ȧ-gō. A group of 45 larger and many small islands, aggregating 4700 square miles, off the coast of Chile, extending from about lat. 44° to 46° S. and from about long. 74° to 75° W. (Map: Chile, B 12). Many of the islands are barren, and the total population is small, being chiefly Araucanians. Administratively the group belongs to the Province of Chiloé.

CHONS, kŏnz, or **KHONSU,** kŏn'sū. An Egyptian deity worshiped at Thebes, where he had a special temple, built by Rameses III at Karnak (q.v.). Of his original character little is known. The sparrow hawk was his sacred animal. Later he was associated with the two principal gods of Thebes, Ammon and Mût. He was called their son and is usually represented as a child or youth, wearing the side lock, the badge of princely rank. As Ammon and Mût were solar deities, Chons, their child, had to take a lunar part, and he is therefore depicted bearing the moon on his head. This led to his identification with other moon gods, e.g., Thout. The Greeks identified him with Heracles, as son of Ammon-Zeus.

CHOPIN, shō'păN', FRÉDÉRIC FRANÇOIS (1810–49). The greatest master of pianoforte composition. He was born at Zelazowa Wola, near Warsaw, Poland, Feb. 22, 1810. The son of refined parents, his musical education began as soon as his predilection for music manifested itself. Adalbert Zwyny was his piano teacher, and later he had lessons in composition from Joseph Elsner. When not quite nine years old, he played in public a concerto by Gyrowetz. The father was a professor in the Warsaw gymnasium, and the family in comfortable circumstances. From the aristocratic social surroundings of his younger years Chopin inherited the liking for fashionable society which was one of his characteristics. A delicate boy, he seems nevertheless to have enjoyed a jest, and he had a talent for mimicry which convinced his friends of later years (Liszt, George Sand, and Balzac among them) that he could have succeeded as an actor.

In August, 1829, he gave two concerts in Vienna, which were attended by all the musical celebrities, who were unanimous in praising both his compositions and performance. His first concert in Warsaw was given in March, 1830, and was followed by a second, the net receipts from both being $600, by no means an inconsiderable sum for a young pianist in those days. He had a love romance with Constantia Gladowska, a vocal pupil at the Warsaw Conservatory, who, however, married a merchant. While giving concerts in Munich, in September, 1831, he heard of the Russian occupation of Warsaw. As a result, he settled, in October of the same year, in Paris, which was his home for the remaining 18 years of his life.

He had composed, but not published, several of his études, among them the great C minor, op. 10, no. 12, sometimes called the "Revolutionary," because inspired by his wrath at the fall of Warsaw before the Russians, his first sonata, and his F minor concerto. The adagio and the rondo had been publicly played by him. (It may be said, in passing, that the dates of publication of Chopin's works are misleading as to the years of composition. Most of them were composed much earlier.) During his life in Paris he was surrounded by men of genius and women at least of talent, among them Liszt, Heine, Berlioz, Mérimée, Meyerbeer, Bellini, Nourrit, Delacroix, Balzac, Dumas, De Musset, Ary Scheffer (who painted his portrait, destroyed in Warsaw by Russian soldiers, in September, 1863), and George Sand. During the first four years of his residence at Paris he made frequent public appearances as a pianist. His E minor concerto he played in February, 1832. Mendelssohn was among those who applauded him. Kalkbrenner was eager to have Chopin study with him—on the mechanical side. Chopin by letter consulted his former teacher, Elsner, who wisely counseled against it, for fear it might impair his originality. Great delicacy and a singing quality of tone seem to have been the characteristics of his playing. His own more colossal pieces, as some of the polonaises, ballads, scherzi, and études, were beyond his physical powers. "Young man," he is reported to have said to a budding virtuoso who apologized to Chopin for having broken a string while playing the famous polonaise militaire, "if I could play that polonaise as it should be interpreted, there would not be a string left in the piano." During the winter of 1835 he gave a concert in the *Opéra des Italiens*. The tone volume was not sufficient to fill the large hall, and the exquisite shading and details were lost, so that the audience was less responsive and enthusiastic than usual at Chopin's concerts. After that the sensitive master, to whom playing before a large audience had always been an ordeal, withdrew entirely from the concert platform, and thereafter played only to a small, select circle in the salons of the aristocracy and of his own friends.

During the summer and early autumn of 1835 Chopin was in Germany. He met his father at Karlsbad, and in Dresden fell in love with Marie Wodzinski, whose brothers had been his schoolmates. On his return trip to Paris he stopped at Leipzig, where he played at the homes of Wieck and Mendelssohn, and also made the acquaintance of Schumann, who had written most enthusiastically about Chopin's works. The following summer Chopin again visited Germany and became engaged to Marie. But scarcely had he returned to Paris, when he learned that the young lady had broken her troth and married a Count Skarbek. In July of that year he made a trip to England of only 11 days, but this sufficed to develop the germs of consumption latent in his constitution. (This disease was in the family. A sister died of it, and his father succumbed to combined chest and heart trouble.)

To Chopin's sensitive nature Marie's faithlessness proved a severe shock. He sought distraction in incessant work and the whirl of society. In this state of mind he met George Sand (q.v.) in the winter of 1837. She was then living separated from her husband, absorbed in her work and her children. With a woman's intuition she divined Chopin's sorrow, with an artist's

intuition Chopin's genius. The inevitable result was a passionate love, which Chopin soon reciprocated. How much they were in need of each other's company became evident when in the fall of 1838 the physician ordered Sand to spend the winter in a southern climate because of an illness of one of her children. The very thought of a possible separation threw the master into a feverish excitement. The problem was solved by going together to Majorca. Unfortunately the winter proved cold and rainy, so that Chopin suffered severely from bronchitis. George Sand proved a tender and constant nurse and inspired his genius to some of its most beautiful utterances, among them those immortal préludes. In the spring they returned, and passed the summer of 1839 at Sand's estate at Nohant.

The next few years passed uneventfully. The winters were spent in Paris, where Chopin was the lion of the salons, the summers at Nohant, where almost all the works of the last years were written. From the very beginning of his residence at Paris, Chopin had been in great demand as a teacher by the foremost families. Unlike some other great masters, Chopin loved teaching, and the money thus earned was his principal source of revenue. Before long publishers also sought his works, for which they paid handsome sums, so that the master was able to indulge his inborn taste for refined and even luxurious surroundings, which were as much a necessity for him as constant association with refined and brilliant people. Chopin was by no means the melancholy dreamer which he has been frequently, but unjustly, represented. Wherever he appeared he was the centre of attraction, not only because of his exquisite art, but also because of the wit and brilliancy of his conversation. His sensitive nature and delicate health, however, rendered him subject to sudden changes of mood and fits of depression. In his intercourse with strangers he was naturally reserved, for in his life, as in his art, he instinctively shrank from anything that was in the least commonplace.

The year 1844 was a momentous one, for in short succession Chopin lost his father and one of the dearest friends of his youth, Matuszynski. A deep gloom settled over his spirit, so that even George Sand lost her influence over him. As his strength failed, his nervous irritability increased, and the relation between the lovers became more and more strained. The complete break came in 1847. The exact cause of their final quarrel will probably never be known. Chopin himself never gave an explanation; Sand said and wrote so much that it is impossible to distinguish truth from fiction. For her it was the end of one of the episodes of her life; for him it was the end of life itself.

In order to forget the master threw himself madly into his work, often teaching seven hours in one day. He even prepared for a public concert, which he actually gave on Feb. 16, 1848. It was his last concert, and the enormous enthusiasm with which his works were received fired his ambition once more, so that he planned a trip to England in spite of the fact that his health was constantly growing poorer. In April he left Paris for London, where he played frequently in select circles. In the hope of enjoying a much-needed rest he accepted an invitation from Jane Stirling, a former pupil, to spend the summer at the castle of her family in Scotland. Late in the fall he returned to London without any improvement of his health. When in January, 1849, Chopin arrived in Paris, his friends were shocked at his appearance. A persistent cough racked his frame. In spite of his completely exhausted condition he resumed his lessons, but soon was compelled to abandon them. He now realized that the end was near. In the morning of Oct. 17, 1849, he died. With imposing splendor the body was conducted to the cemetery Père Lachaise and interred near the graves of Cherubini and Bellini. But his heart was sent back to Poland, where it is preserved in the church of the Holy Cross at Warsaw.

That Chopin was the creator of a new style of writing for the pianoforte has long been admitted. That at the same time he was one of those masters who have enormously increased the means of emotional expression and enriched the art by the creation of absolutely new forms was generally realized only within the present century. Still later came the knowledge that the sum total of Chopin's achievements entitles the composer to a foremost place among the supreme masters of music.

The increase in the range and power of the piano, together with the perfection of the damper pedals, about the year 1830 suggested new possibilities undreamed of before. Foremost among these were the wide distribution of the tones of a chord, the attainment of a real "singing" tone, practically an endless variety of tonal color and the utmost refinement of dynamic shading. Intuitively Chopin recognized all this and adopted a new style of writing, which he also carried to the point of perfection, so that neither Schumann nor Liszt, who both adopted this style, was able to develop it further. Had he accomplished nothing else, Chopin's fame would rest on a firm foundation. But he did infinitely more. He overthrew the whole system of harmony as taught at that time, and by means of enharmonic modulation brought the most remote tonalities into close relation. In his later works Beethoven had shown how ornamentation could become a means of real expression. This idea Chopin developed to the last degree, making embellishments a potent factor of musical expressiveness, a real heightening and intensifying of the melodic line, almost an integral part of the melodic and harmonic scheme. All this means a lasting contribution to the means of emotional expression. When speaking of Chopin's melodic gift, it is not possible to employ anything but superlatives. His wealth of melody, in the best sense of the word, is inexhaustible, like Schubert's. Almost invariably his themes are broad, flowing melodies, of noblest beauty and irresistible power. They captivate and grip the listener at the first hearing and never lose their charm. In this respect Chopin stands alone among the masters of the first rank. The music of Bach, Beethoven, Wagner, Brahms, and, to some extent, even of Schubert, discloses its real greatness and surpassing beauty only after repeated hearing. It grows with familiarity. Chopin's music discloses itself more readily; its appeal is almost instantaneous, but deep and lasting. In this last respect it is separated by a vast gulf from the music of lesser masters. Their melodies soon pall, in direct ratio to the frequency of repetition, whereas Chopin's never lose their perennial freshness.

Unsurpassed among the master's works stand the four great ballads, op. 23 (G m., 1836), op. 38 (F, 1838), op. 47 (A flat, 1841), and op. 52 (F m., 1843). According to the composer's own statement they were inspired by poems of Mickiewicz. Instead of choosing some existing form Chopin crystallizes his inspiration in a new, compact, and symmetrical form and calls it "ballad," thus indicating in a very general way the epic character of the works. The listener's imagination may supply any programme that he pleases, if a programme is needed.

On the same high level as the ballads stand the four scherzi, op. 20 (B m., 1835), op. 31 (B flat m., 1837), op. 39 (C sharp m., 1840), op. 54 (E, 1843). The name is absolutely misleading, for the form is entirely Chopin's own, and the contents have nothing of either the lightness or the robust humor that characterize the scherzo of Beethoven. Instead, the Polish master portrays poignant sorrow, fierce revolt, bold defiance, passionate regret. Occasionally, indeed, are heard calmer strains of transcendent beauty and infinite longing, but soon the seething sea of passion bursts upon them.

In some of his 13 polonaises the master soars to lofty heights, and frequently compasses the region of the sublime. The inequality among these works is due to the fact that six are early works, several of these having been published without the composer's sanction after his death. The great ones are the two constituting op. 40 in A and C m. (1840), op. 44 in F sharp m. (1841), op. 53 in A flat (1843), and the polonaise-fantaisie, op. 61 in A flat (1845). In some of these Chopin gives intense subjective expression to the melancholy, gloomy side of his own character; in others, from a more objective standpoint, he portrays with irresistible brilliancy and elemental power the chivalrous and warlike spirit of the Polish nation.

Throughout his life Chopin cultivated the form of the mazourka. In 13 opus numbers he published 55 of these national dances. It is in them that the national element appears most strongly. Frequently the composer employs genuine folk melodies, which generally are conceived in the old church modes. (See MODES.) The distinctive character of these modes is faithfully preserved in the harmonic treatment, while the melody and rhythm are idealized. The proper performance of these idealized dances depends largely on a judicious use of the *rubato* (q.v.).

Likewise, in the waltzes, 17 in number, the form and content are idealized to such an extent that they are dances rather of the spirit than of the body. There is about them an aristocratic air, the refinement of the elegant salons, the atmosphere of which was so congenial and essential to the composer.

The four impromptus, op. 29 in A flat (1838), op. 36 in F sharp (1840), op. 51 in G flat (1843), and op. 66 in C sharp m. (published 1855), are free fantasies, real improvisations, but withal in well-defined form, with which Chopin never could dispense. The effect of abandon is due to the unexpected juxtaposition of varying moods rather than to looseness of formal structures. Closely allied in spirit to the impromptus is the fantaisie, op. 49 in F m. (1843), a work of intense power and concentration, beyond the capabilities of all but the greatest pianists.

In his 19 nocturnes the master has poured out a profusion of noble melody, infinitely tender. As through a silvery veil we behold mystic shapes moving in the fairyland of dreams. No other works of the master disclose to a similar extent his marvelous skill in the use of ornamentation. But one of these nocturnes, the greatest of all, op. 48 in C minor (1842), towers far above the others, both in formal dimensions and grandeur of content. Those passionate, mournful strains with their incisive rhythm, the sublime middle section with its sonorous chord progressions, the agitation and stress of the closing section, tell of heroic struggles doomed to a tragic ending.

During his stay at Majorca in the winter of 1838 Chopin wrote the greater part of those small pieces which he published under the title of "Préludes, op. 28." Each and every one of these, some only a dozen bars in length, is an immortal masterpiece, showing some distinctive trait of the composer's genius. Here we find the power of the scherzos, the fire of the ballads, the brilliancy of the polonaises, the elegance of the waltzes, the grace of the mazourkas, the dreaminess of the nocturnes. Short as these sketches are, each is a well-rounded artistic unit, marvelously expressive and suggestive.

The berceuse, op. 57 (1845), and barcarolle, op. 60 (1846), are works of such intimate and delicate sentiment, of such supreme refinement of figuration, that a public performance in a large auditorium seems to despoil them of their ethereal charm.

In his treatment of classical forms Chopin was not successful. This frank admission does not in the least detract from the master's greatness, nor does it cast the slightest reflection on the artistic value of the form. It only means that Chopin's individuality required some other form for its fullest expression, and that, like Wagner's, it was powerful enough to create its own form. Chopin, the ardent admirer and student of Bach and Mozart, began by expressing himself in the classical forms of the rondo, variation, and sonata. These works are the rondos, op. 1, 5, 16; the variations, op. 2 and 12; a trio for piano, violin, and 'cello, op. 8; a sonata in C minor, op. 4; the two piano concertos in E minor and F minor, op. 11 and 21; and the Allegro de Concert in A, op. 46. In spite of its advanced opus number and its publication in 1841, this last work bears all evidence of being an early composition. Niecks believes it to be a movement of a concerto for two pianos mentioned by Chopin in a letter dated Dec. 21, 1830. In all these works there is pretty close adherence to the traditional forms and much beautiful, occasionally even quite characteristic, music. Yet it is not the true Chopin, the bold innovator of the later period. The two sonatas in B flat minor, op. 35 (1840), and in B minor, op. 58 (1845), two of the master's great works, cannot be classed with the early compositions, which are distinctly cast in the classical forms. These two sonatas are as different from the classical sonata as are Chopin's scherzi from the classical scherzo. In the exposition and development sections Chopin follows the classical tradition quite faithfully, but breaks away entirely in the repetition after the development. In both sonatas he intentionally discards in this place the principal subject entirely and follows his own form as determined by the musical ideas, giving great prominence to

the second subject. In every bar of these works we feel a conscious purpose and the guiding hand of the master. Among the most remarkable works are the 24 études in two sets, op. 10 (1833) and op. 25 (1837). Primarily they were written to furnish much-needed material for the mere mechanical study of the new piano technic employed by Chopin. Each étude deals in masterly fashion with some particular problem of finger technic or tone production. With almost prophetic foresight provision is made for every possible contingency. But, above all this, these studies are musical masterpieces of the highest order, of the widest emotional range, of transcendent beauty.

For the sake of completeness brief mention must be made of Chopin's 17 Polish songs, published as op. 74 in 1855. Between 1824 and 1844 the master wrote a considerable number of songs, most of which have been lost, because the composer himself did not deem them worthy of publication. After his death his friend Julius Fontana collected all manuscripts and published them in 1855. These posthumous works bear the opus numbers 66–74. With the exception of the beautiful fantaisie-impromptu, op. 66 (1834), all are early works written before 1830, scarcely worthy of the name of their author.

And yet they are of great value in another respect. Considered together with the other early works, op. 1–20 (approximately), they prove conclusively that Chopin, just as every other great master, passed through a stage of development; that he did not appear as the real Chopin, the supreme master, in his first works. The fact is that his development was very rapid, that he soon found himself, that the early compositions indeed foreshadow the individuality of the later ones. But in the concessions which they make to the display of virtuosity on the part of the performer they are quite the product of their time. They also show that the composer is still groping about in search of a proper vehicle of expression. Yet one thing arrests the attention: all are marked by a striking characteristic, the conscious employment of the new piano technic. With the ballad in G minor, op. 23, in 1836, Chopin strikes out in his own peculiar path, on which until now none has followed him. As he had found no form that would adapt itself to his new and strikingly original utterance, his genius intuitively created those forms which permitted him his fullest and freest artistic expression. In his earlier attempts Chopin had also gained the conviction that it was not for him to dominate the orchestra, and after that time he devoted all his energy to the piano. This fact has been held against him by no less a man than Schumann, and it certainly has retarded the appreciation of Chopin's towering greatness. It is not the means of expression nor any particular form that determines greatness, but the content, the essential quality of the musical ideas themselves, the power of thematic invention. When this test is applied, there must be assigned to Chopin a prominent place among the few supreme masters of the first rank.

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CHOPINE, chô-pēn′ (from Sp. *chapin*, clog). A high clog or slipper, deriving its name possibly from the sound *chap, chop*, made by the wearers in walking. Chopines probably originated in Turkey and were worn in Spain and Italy about 1600. It was from Venice that these exaggerated shoes found their way into England. There is scant evidence, however, that they became fashionable among English ladies, although they are repeatedly mentioned in English literature as parts of seventeenth-century costume. Thus they were worn by ladies under the shoes and were usually made of wood covered with leather, often of various colors and frequently painted and gilded. Some of them were as much as half a yard high; and in Venice, where they were usually worn, their height distinguished the quality of the lady. Evelyn, in his *Diary* (1645), defines them as "high-heel'd shoes particularly affected by these proude dames, or, as some say, invented to keepe them at home, it being very difficult to walke with them." Frequent references to them are found in Scott and other writers, even as late as Charles Reade, whose *Cloister and the Hearth* (1861) has the line: "Your wooden-heeled chopines to raise your little stunted limbs up."

CHOP'TANK RIVER. A river rising in Kent Co., Del. (Map: Maryland, O 5). It flows southwest through that State and Maryland and becomes a wide estuary 20 miles long as it nears Chesapeake Bay, into which it empties. It is navigable for small vessels for about 40 miles.

CHORAGIC (kô-rāj′ĭk) **MONUMENT** (from Gk. χορᾱγικός, *choragikos*, choragic, from χορᾱγός, *choragos*, leader of the chorus, from χορός, *choros*, dance + ἄγειν, *agein*, to lead). The choragus, or person at Athens who, on behalf of his tribe, had borne the expense of furnishing and instructing the chorus (q.v.), and who, in competition with the other tribes, had exhibited the best musical performance, received a tripod for a prize; but he had the expense of consecrating it and of building the monument on which it was placed. There was in Athens a whole street formed by these monuments, called the "Street of the Tripods." A fine specimen still remaining is "the choragic monument of Lysicrates," erected in 334 B.C., in honor of a victory with a chorus of boys. Consult E. A. Gardner, *Ancient Athens* (New York, 1902), and Weller, *Athens and its Monuments* (ib., 1913).

CHORAGUS. See CHORAGIC MONUMENT; CHORUS.

CHORALE, kô-rāl′ (ML. *choralis*, from Lat. *chorus*, Gk. χορός, *choros*, dance, chorus). A melody to which hymns or psalms are sung in church by the congregation in unison. The Catholic church service has from early times contained chorales, but the name is generally applied to those in the style introduced by Luther into the German Protestant church in the sixteenth century. Realizing the great power of music to awaken religious emotion, he deter-

mined to carry his reforms into the music of the church service and to invigorate it with new life. He selected simple tunes from many sources, sacred and secular, and arranged them to fit the hymns and psalms used in the service. Some of the most attractive of the ancient Latin hymns were chosen; the chorale "Herr Gott, dich loben wir," is adapted from a song of praise by St. Ambrose. German songs furnished material for many others.

The inspiration proved a great success; congregations everywhere joined heartily in singing the familiar melodies, and their religious interest took a new growth. The chorale became a popular form of composition, and many fine examples of this style were written during the sixteenth and seventeenth centuries. The most important of the early collections of chorales was the one published by Luther and his friend Johann Walther, in 1524, called the *Enchiridion*. Chorales were intended always to have an organ accompaniment, which was usually contrapuntal, and as time went on these accompaniments were made more and more elaborate by the organists, who found this a tempting field for display. Originally chorales were strongly rhythmical in character, with frequent alternations of duple and triple rhythm; and this, being in direct contrast to the droning, unrhythmical nature of the Gregorian chant, formed one of their greatest attractions. By a gradual process of change, however, this rhythmic element has disappeared, and chorales are now sung in notes of almost uniform length. German writers complain of this "flattening-out" process and regret the loss of character which has resulted. But even without its original rhythm the fine simplicity and stately solemnity of the chorale render it an ideal form for the expression of religious fervor. Probably the most famous of all chorales is the one popularly accredited to Luther himself, "Ein' feste Burg ist unser Gott." This stirring tune has been incorporated into many compositions. It appears in one of Bach's cantatas and in Mendelssohn's *Reformation Symphony*, is heard in Wagner's *Kaiser Marsch*, and forms an important theme in Meyerbeer's opera *Les Huguenots*.

Bach's works abound in beautiful chorales, and when these are sung by a large chorus the effect is wonderfully impressive and inspiring. Consult F. Spitta, *Das deutsche Kirchenlied* (Leipzig, 1912), and P. Griesbacher, *Kirchenmusikalische Stilistik und Formenlehre*, vol. i (Ratisbon, 1912).

CHORAL (kō'ral) **MUSIC.** Music written in parts, usually for four different voices, and performed by a chorus or choir. See ANTHEM; HYMNOLOGY.

CHORAL SOCIETIES. Associations of amateur singers formed for the purpose of performing large choral works are of comparatively recent date. During the Middle Ages and down to the end of the eighteenth century vocal works were performed exclusively by professional musicians, who composed the regular church choirs or were attached to some royal or aristocratic chapel. Public concerts were of rare occurrence. The chief musical interest after the beginning of the seventeenth century was the opera. As operatic performances were prohibited during Lent, performances of oratorios and other works of a sacred character were instituted. With the growth of musical culture music lovers were no longer satisfied with the few public performances, but met together for the purpose of studying concerted works. For the instrumental parts the services of professional musicians were enlisted. Although the absence of any high standards or lofty aims did not allow these early attempts of amateurs to reach a high degree of perfection, these meetings, nevertheless, did prepare the way for the establishment of the choral societies with artistic aims. The sudden and rapid growth of instrumental music, beginning with Haydn and Mozart, and resulting in the perfection of the modern orchestra, also created a desire for a higher standard in the performance of vocal music.

The merest accident led to the establishment of the first permanent choral society, which is still in existence to-day and world-famous as the Berliner Singakademie. Karl Christian Fasch (1730–1800) had settled in Berlin as a singing master. In 1783 Reichardt, at that time royal chapelmaster, submitted to Fasch the score of a 16-part mass by Benevoli. In a spirit of rivalry Fasch at once set to work to compose a similar mass, which he attempted to perform with a chorus of 20 singers selected from the royal chapel in Potsdam. This attempt proved a failure, and the work was laid aside. Meanwhile the number of Fasch's pupils had increased considerably. Among these were the daughter and stepdaughter of the Privy Councilor von Milow, who were so much interested in their teacher that they persuaded a number of fellow students to form a little chorus for the purpose of performing Fasch's mass. This was in the autumn of 1790. During the winter the meetings were discontinued; but when in the following spring a meeting was called, 27 members were present. A record of the meetings was then kept, and from the date of the first of these (May 27, 1791) the foundation of the Singakademie is reckoned. These singers entered heart and soul into the task they had undertaken, and when the mass had been successfully performed they did not disband, but decided to remain together under the able leadership of Fasch. In 1793 the society numbered 43 members, and permission was obtained to hold their meetings in the Royal Academy of Science and Art. Fasch then formally organized the society. He retained absolute control over all musical affairs, while the administrative duties were vested in a board consisting of three men and three women. Each member paid 12 groschen a month, while the professional instrumentalists were exempt from dues in consideration of their services. At first the meetings of the society were strictly private. On April 8, 1794, a limited number of persons were invited, who were so much impressed with the excellence of the work done that a demand for public concerts was created. Accordingly several concerts were given every season. Admission was only by invitation. When in 1800 Zelter succeeded Fasch, a regular scale of admission prices was adopted. By that time the chorus of the society had increased to 115 voices. In 1802 the membership was 200; in 1813, 300; in 1827, 400; in 1833, 500. At present the membership is about 600. Among the proudest achievements of the Singakademie is the performance of Bach's *Passion according to St. Matthew*, under the direction of Mendelssohn, in 1829.

In spite of the great success of the Berlin Singakademie, the other cities of Germany were slow to follow in the establishment of choral

societies. Thirty years after the foundation of the Berlin institution only 10 such societies were in existence. But after that one city followed another, so that to-day there is scarcely a single town which does not boast its choral society. In England choral culture was widely diffused through the growth of music festivals. Although originally the chorus at such festivals was recruited from the regular choruses of the churches, it was not long before the number of singers was considerably increased by the addition of amateur voices. To-day England surpasses all other countries in the excellence and efficiency of its choral societies. The history of English choral societies is practically that of the English Music Festival, to which article the reader is referred.

In the United States choral societies enjoy the popular favor as much, and are cultivated almost as extensively, as in England. When the Pilgrim Fathers first landed, they opposed the use of any kind of music in church; but gradually a more liberal spirit gained ground, so that not only was music introduced into the services, but schools of singing also were established. The aim of these was merely to teach the singing of simple hymns, but in 1724 a "sacred singing school" was founded at Stoughton, Mass., and this, on Nov. 7, 1786, became the Stoughton Musical Society. Now that a beginning had been made, other choral societies came into existence. Up to 1820 the choral societies in the United States exceeded in number those of Germany, but could not compare with them in the quality of the work done. With increased facilities of communication with the Old World musical culture in America advanced step by step, so that in 1815 the Handel and Haydn Society was established in Boston. This institution became to the development of music in America what the Singakademie was in Germany—a model for all similar organizations. At its first concert, on Christmas Day, 1815, the chorus of the Handel and Haydn Society consisted of 100 members. Until 1847 the president of the society acted as conductor, and consequently the performances were rather crude, although marked by a spirit of earnestness. In that year a professional musician was elected as regular conductor. When, in 1852, Carl Bergmann assumed the leadership, the performances rose to a high level. But the present excellence of the society is largely due to the untiring and efficient labors of Carl Zerrahn, who directed the destinies of the organization from 1854 to 1898, with the exception of the seasons 1895–97, when B. J. Lang was the conductor. Since 1899 Emil Mollenhauer has been the conductor.

Shortly after the establishment of the Boston Handel and Haydn Society, a choral society bearing the same name was organized in New York. This, however, was short-lived and in 1823 branched out into two rival societies—the New York Choral Society and the New York Sacred Music Society. The former of these began its career on a very ambitious scale and soon was disbanded; whereas the latter rose to great importance, though it came to an end in 1849. But as soon as one society disbanded another sprang up so that New York was never without performances of choral works. This continued until 1873, when Dr. Leopold Damrosch founded the Oratorio Society. The first concert took place Dec. 3, 1873, at which occasion the chorus numbered about 60 members. When Dr. Damrosch died, in 1885, his son Walter succeeded him as conductor. Under his direction the chorus increased to 600 members. In 1898 he was succeeded by his brother Frank Damrosch, after whom Louis Koemmenich assumed control in 1912. Another choral society of importance is the Musical Art Society, founded by Frank Damrosch in 1896. This organization is unique, inasmuch as it consists exclusively of professional trained singers. The purpose of this society is the performance of older church music of the Palestrina style. The People's Choral Union is a society founded by Frank Damrosch in 1892. It consists of over 3000 members, recruiting themselves from among the laboring classes. The organization has three classes of members—those constituting the elementary class, the advanced class, and the choral union proper. Any self-supporting man or woman may join the elementary class, where thorough instruction as to the proper use of the voice and the rudiments of music is given. From this class the pupils are promoted to the advanced class, whence upon graduation they pass to the choral union. The attendance at the various classes numbers about 2500, 450, and 1200 respectively. Meetings are held every Sunday, and once, in May, a public concert is given. Another important New York society, the Arion, was founded in 1854. By 1902 its membership had increased to 1200.

In the West, Cincinnati, Chicago, and Milwaukee are famous for their choral societies. Here chiefly the German element of the population forms male choruses. But there is no lack of mixed choruses, which meet yearly for a great singing festival. In making these festivals a means for the spreading of musical culture and intelligence, Theodore Thomas (q.v.) and Frank van der Stucken (q.v.) were indefatigable. See MUSICAL FESTIVAL.

CHORASSAN, kō'rā-sän'. See KHORASAN.

CHORAZIN, kō-rā'zin (Gk. *Χοραζείν, Chorazein*). A town in Galilee mentioned in Matt. xi. 21 and Luke x. 13 (Map: Palestine, D 2). Along with Bethsaida, it is referred to as one of the cities in which Jesus had performed "mighty works" and which was condemned by Him because of its unreceptivity to them. As there is no record in the Gospels of any ministry of Jesus in these cities, the latter of which was the native place of three of His disciples (John i. 44; xii. 21), it has been surmised that Jesus carried on in this region an individual work before He called the disciples to His following (Mark i. 16–20). The site is uncertain, but the most probable identification is with the modern *Kerāseh*, located in a small valley a short distance from the north end of the Sea of Galilee and west of the Jordan, 2½ miles north of *Tell Hum*. Extensive ruins are to be seen here, showing the former importance of the town, which, however, is not mentioned in ancient writings outside the New Testament.

CHORD. See HARMONY, *Chords*.

CHORDATA, kôr-dā'tȧ (Neo-Lat. nom. pl., from Lat. *chorda*, chord). The phylum of the animal kingdom that embraces all the vertebrated animals — fishes, amphibians, reptiles, birds, and mammals, together with the Urochorda, or ascidians, and the Adelochorda, or Hemichorda (see BALANOGLOSSUS)—based upon the fact that all these have as a common feature a structure termed the notochord, although in some of the lowest it is present only in the very

young condition. The notochord represents, and in the higher forms is replaced by, the spinal column. "Another nearly universal feature is the perforation of the wall of the pharynx, either in the embryonic or larval condition only, or throughout life, by a system of clefts—the bronchial clefts; and a third is the almost universal presence at all stages, or only in the larva, of a cavity or system of cavities, the *neurocœle*, in the interior of the body, lying above the central nervous system."

CHOREA, kō-rē′ȧ (Lat., from Gk. χορεία, *choreia*, dance), or SAINT VITUS'S DANCE. A disease due to an infectious agent or a toxin, of undecided origin, but probably rheumatic, acting on the central nervous system, and characterized by involuntary and irregular jerky movements of the muscles of the face, neck, chest, arms, hands, legs, feet, back, or abdomen. The infectious type of chorea was first recognized by Sydenham and is still known as Sydenham's chorea, but the term *Chorea Sancti Viti* was first used by Paracelsus and applied to a form of dancing mania, of an hysterical nature, prevalent in central Europe in the sixteenth century, called in Italy "tarantism" (q.v.). Those afflicted sought a cure at the shrines of various saints, notably those of St. Vitus, St. John, and St. Anthony. Most cases occur in neurotic children 5 to 13 years old, and attacks are superinduced by fright, shock, injury, or worry, overstudy, errors of refraction, and to some extent by imitation. Girls are attacked more than twice as often as boys. Women during pregnancy are occasionally attacked. The movements occur either when the person is performing voluntary motions or when at rest; but they generally cease during sleep. Often the attack begins by dropping articles, grimacing, stumbling, or winking. It may last from six weeks to six months, and relapses are frequent. The appetite is variable, and nutrition is impaired, with resulting anæmia. In many cases fibrinous deposits are found on the walls of the heart. The seat of the trouble is in the brain and spinal cord, but there is no mental change in the patient, except slight emotional excitability. Chorea is rarely fatal in the United States. In England the mortality reaches 2 per cent. The treatment consists in rest from violent exercise and all mental exertion, cold sponging, nourishing food, iron, and arsenic, and a few other drugs, electricity, and change of air and environment. One variety of chorea (Huntington's) is hereditary; this is attended with progressive mental deterioration and terminates in dementia. (See INSANITY.) Consult Church and Peterson, *Nervous and Mental Diseases* (Philadelphia, 1901).

CHORE'A SCRIPTO'RUM, or WRITER'S CRAMP. See NEUROSIS.

CHOREE, kō-rē′. The same as trochee (q.v.).

CHOREPISCOPUS, kō′rē-pĭs′kō-pŭs (Lat., from Gk. χωρεπίσκοπος, *chōrepiskopos*, from χώρα, *chōra*, place + ἐπίσκοπος, *episkopos*, overseer, bishop). An order of ministers of ancient origin, whose functions were to assist city bishops in rural districts or remote places. They acted in a subordinate capacity and possessed limited powers, acting as colleagues or vicars of the bishops. They possessed the privilege of attending councils in their own right and not merely as substitutes for bishops. At first they were confined to the Eastern church, but began to multiply in the Western church in the fifth century. They were succeeded after the tenth century by archdeacons, vicars-general, and rural deans. In the East, the order continued to exist until the ninth century, when it was superseded by the exarchs.

CHORIAMBUS, kō′rī-ăm′bŭs. See VERSIFICATION.

CHORLEY, chôr′lĭ. A market and manufacturing town of Lancashire, England, on the Leeds-Liverpool Canal, 22 miles northwest of Liverpool (Map: England, D 3). It is a thoroughly progressive municipality. Since the incorporation, in 1881, it has obtained control of its gas supply, and it maintains markets, slaughterhouses, and cemeteries. Its water is supplied by the Liverpool municipality. The ancient Norman parish church is worthy of notice. The manufacture of cottons, muslins, and calicoes constitutes the principal industry. Railway cars are also made. In the neighborhood are stone quarries and collieries. Pop., 1901, 26,900; 1911, 30,315.

CHORLEY, HENRY FOTHERGILL (1808–72). An English author and musical critic. He was on the staff of the London *Athenæum* from 1830 to 1868. He was also for a while musical critic for the *Times*. During most of that time his literary reviews, especially in belles-lettres, were numerous and important, and the entire direction of the musical department was in his hands. He wrote many librettos, and several novels, dramas, and poems, but was more successful as a critic and biographer. Among works separately published were: *Memorials of Mrs. Hemans* (1836); *Music and Manners in France and Germany* (3 vols., 1841); *Modern German Music* (1854); *Handel Studies* (1859); *Thirty Years' Musical Recollections* (1862). His unfinished autobiography formed the basis of the *Autobiography, Memoir, and Letters*, ed. by Hewlett (London, 1873).

CHOROGI, kō′rō-gī. See STACHYS.

CHOROID (kō′roid) **COAT.** See EYE.

CHORON, shō′rōN′, ALEXANDRE ETIENNE (1772–1834). A French writer on music. He was born at Caen, studied with Roze and Bonesi, and is said to have accumulated more information on the theory and practice of music than any French musician before him. As corresponding member of the Academy (1811), he undertook the reorganization of the *maîtrises*, or training schools for church choirs, and was successively appointed conductor of religious festivals and director of the Grand Opéra (1816). In 1816 he reopened the Conservatoire, which had been closed in the previous year, under the name of the Ecole Royale de Chant et de Déclamation. In 1817 his appointment to the directorship of the Opéra was suddenly revoked, and he established the famous Conservatoire de Musique Classique et Réligieuse, which existed until 1830 and greatly promoted the musical instruction of the masses. Choron was a pedagogue of pronounced genius, who opened a new field to French musicians. His numerous works include: *Principes d'accompagnement des écoles d'Italie* (1804); *Introduction à l'étude générale et raisonnée de la musique*, a capital work, though unfortunately unfinished; *Méthode de plainchant* (1818); *Manuel complet de musique vocale et instrumentale*, etc. (1836–38). His compositions, which include a requiem and an opera, were never published. Consult H. Reity, *Notice historique sur Choron et son école* (Paris, 1873), and G. Vauthier, *Choron sous l'empire* (Poitiers, 1909).

CHORRILLOS, chô-rē'lyôs. A bathing resort of Peru, situated on the bay of Chorrillos, 7 miles south of Lima (Map: Peru, B 6). The town is a favorite summer resort for the inhabitants of Lima. Pop., 5000. It was the scene of a Peruvian defeat at the hands of the Chileans, Jan. 13, 1881.

CHORUS, kō'rŭs (Lat., from Gk. χορός, *choros*, dance, chorus; connected with χόρτος, *chortos*, inclosure, Lat. *hortus*, garden, OIr. *gort*, crop, Ger. *Garten*, garden, Eng. *yard*). Among the early Greeks, a festal dance, accompanied by music. Through its development in the Attic theatre the word came to mean particularly the group of dancing singers who took part in the rendering of a play, and was also applied to the parts of the composition itself which they performed. The primitive dithyrambic chorus of 50 voices in honor of Dionysus, supplemented by the addition of actors (see ARION; THESPIS), was, in fact, the source of the Greek drama.

In the time of the Attic tragedy the chorus consisted of 12 or 15 persons, in character befitting the scene and nature of the plot, who usually made their entrance to the orchestra from the sides early in the play and remained there before the stage throughout the performance. At pauses in the acting the chorus, with an accompaniment of dancing movements, sang lyrical passages having reference suggestively to the subject and progress of the drama and serving to heighten and solemnize the impression produced by the actors. Occasionally the chorus, in the person of its leader, called the "corypheus," participated briefly in the dialogue itself. The chorus has been thought to represent the attitude of the ideal spectator of the action, taking part with or against the persons on the stage by advice, comfort, exhortation, or dissuasion. At times the chorus was divided and spoke or sang antiphonally. These divisions passed from side to side in movements from which originated the naming of the single songs or stanzas, such as strophe, antistrophe, and epode. Of the musical element in the composition of the ancient choruses little is known with any certainty. Possibly it was only a kind of rhythmic declamation and very simple, though the metres of its verse are often complicated. It was accompanied by flutes in unison.

The charge of organizing the chorus was considered a great distinction among the people of Athens, being one of the public services (λειτουργίαι, *leitourgiai*) offered by rich citizens to the state. The person appointed for the purpose was called the *choragus*, and the one most successful in each competition was awarded a prize. The honor was expensive, as the choragus had to pay all the cost of training the chorus, besides feeding and lodging them and providing their masques and dresses.

In comedy the chorus was somewhat more numerous than in tragedy, and was often fantastically adapted to the humor of the story, as, e.g., that in the *Clouds* and that in the *Frogs*, comedies of Aristophanes. Later comedy, however, gradually discarded the chorus, and with the decline of ancient tragedy the chorus fell into disuse. In recent times there has been some attempt, as in Schiller's *Bride of Messina*, to produce the chorus on the stage in the manner of the ancients; but the music that has been occasionally set to some of the Greek tragedies can give but slight idea of that which originally accompanied them. Consult: Haigh, *The Attic Theatre* (Oxford, 1889); id., *The Tragic Drama of the Greeks* (ib., 1896); Donaldson, *The Theatre of the Greeks* (8th ed., London, 1875).

In music, a vocal composition in which each part is sung by a number of singers, as distinguished from a duet, trio, quartet, etc., in which each part is sung by a solo singer. The term also denotes the entire body of vocalists performing a choral composition. Choruses may be written for one part (unison), two, three, four, five, or six parts. Eight-part choruses are almost invariably double choruses, consisting of four parts each. Works written for 12, 16, 20 and more parts are really four-part works written for a number of choruses. The greater the number of parts, the more the individuality of each part is destroyed. Hence modern composers rarely write for more than double chorus. The foundation of all choral writing is the four-part chorus. According to the quality of voices employed choruses are distinguished as mixed choruses (sopranos, altos, tenors, basses), male choruses (first and second tenors, first and second basses), female choruses, also sung by boys' voices (first and second sopranos, first and second altos). Choruses without instrumental accompaniment are called *a capella* (q.v.). The effect produced by a body of singers depends far more on the quality and training of the individual voice than on mere numbers. It is reported that at the coronation of Napoleon I in Notre Dame at Paris the chorus of 35 highly trained singers from the Papal Chapel singing a capella *Tu es Petrus* produced a far greater effect than the special chorus of hundreds of voices accompanied by 80 harps.

In the earliest operas the chorus took no part in the action. To it was assigned the rôle of the chorus in the Greek drama, that of narrator or commentator. One of Gluck's most important reforms was the employment of the chorus as an essential factor of the dramatic action. In the operas of Spontini, Auber, Halévy, Bizet, and Verdi the chorus is of prime importance. Wagner, who in his earlier works had obtained some of the greatest climaxes from his masterly treatment of the choruses, banished this form on purely theoretical grounds from his *Tristan* and *Ring*, but later modified his extreme view and reinstated the chorus in his *Meistersinger* and *Parsifal*. Consult A. Mees, *Choirs and Choral Music* (New York, 1901); H. Coward, *Choral Technique and Interpretation* (London, 1911).

CHOSE (shōz) **IN ACTION** (Fr. *chose*, thing, from ML. *cosa*, *causa*, thing, Lat. *causa*, cause). In the law of England, that kind of property which is founded not in possession, but in the legal right to possess. As this right can, in general, be vindicated and made available only by means of an action, the property to which it relates, whether real or personal, is called a thing (Fr. *chose*) in action, to distinguish it from a thing already in possession. The right to recover money due on bonds and bills, and that to recover on goods bought and not yet delivered, are examples of choses in action, as is also the right to compensation for damages occasioned by breach of contract or by tort.

By the strict rule of the ancient common law, no *chose in action* could be assigned or granted over, because it was thought to be a great encouragement to litigiousness if a man were allowed to make over to a stranger his right of going to law. (See CHAMPERTY.) But this

nicety is not now so far regarded as to render such a transaction really ineffectual. It is, on the contrary, in substance a valid and constant practice; though, in compliance with the ancient principle, the effect of assigning a chose in action is to confer on the assignee a power of attorney to prosecute the action in the assignor's name for the assignee's own benefit. The assignment has this effect in law, and not in equity alone, as is commonly stated. If, however, the assignor interfered with his assignment by collecting the chose in action, or otherwise, equity would protect the assignee's rights, provided the assignment was made for value. The King is an exception to this general rule, for he may always either grant or receive a chose in action by assignment. By the law merchant an indorsee of negotiable paper could sue upon the paper in his own name. The law relating to *choses in action* was formerly the same in the United States as in England. But in many States, as in New York, the assignee of a chose in action is now allowed to sue in his own name, provided the chose in action does not belong to one of the excepted classes (such as the right to recover for personal injuries, for breach of promise to marry, for seduction, etc.). The assignee of a chose in action, however, takes it subject to all defenses which might have been interposed to it had the action been brought upon it by the original owner. Choses in possession are commonly called "chattels" (q.v.). The branches of the law relating to choses in action are specifically treated under such titles as ASSIGNMENT; SPECIFIC PERFORMANCE; NEGOTIABLE INSTRUMENTS; ETC. Consult the authorities referred to under CONTRACT; and for a discussion of the early English law upon the ownership of choses in action, consult Pollock and Maitland, *History of English Law* (Boston, 1899).

CHO'SEN'. See KOREA.

CHOSHI, chō'shĕ. A prefectural town of Japan, situated on the east coast of Nippon, 72 miles by rail from Tokio (Map: Japan, G 6). It extends for about 2½ miles along the river of Tonegawa and has a temple situated on an eminence in the centre of the city. The chief occupation is the manufacture of fish oil. Pop., 1903, 16,154; 1906, 18,721.

CHOSROES. See KHOSRU.

CHOTA NAGPUR, chō'tà năg-pōōr', or CHUTIA NAGPUR. A southwest division of Bengal, Bihar, and Orissa, British India (q.v.). The division formerly comprising the five districts of Hazāribāgh, Ranchi, Palamau, Mānbhum, and Singhbum. It is sparsely inhabited, with a density of 181 per square mile compared to 438 for the whole of Bengal, the largest towns not exceeding a population of 5000. Area, 27,679 miles. Pop., 1891, 4,628,792; 1901, 4,900,429; 1911, 5,754,008. The political agency comprises nine tributary states, whose area is 16,054 square miles. Pop., 1891, 883,500; 1901, 982,400. The region is mountainous, being largely contained in three plateaus, and lies between the basins of the Ganges and its tributaries, the Sov and the Manahadi. It is largely inhabited by aboriginal tribes. Coal in considerable quantities is found, some gold and mica. Tea, rice, corn, potatoes, and oil seeds are cultivated. The climate is dry and healthful.

CHOTIN. See KHOTIN.

CHOUANS, shōō'ăN' (corruption of Fr. *chathuant,* screech owl). The bands of insurgent peasants in Brittany and Maine who during the French Revolution, following the Vendéans, fought for the King. They were so called from Chouan, the nickname of their first leader, Jean Cottereau, smuggler and soldier. The species of mingled brigandage and warfare known as the *chouannerie* first broke out in 1793, after having been fomented assiduously by the priests and the agents of the royal family. After several exploits of the guerrilla sort Cottereau was killed, July 29, 1794, near Laval. Other leaders, however, appeared: Cadoudal, Désoteux, Charette, Puisaye. The pacification of La Vendée in 1795 gave Hoche an opportunity to crush the Chouans: but they sprang up again in 1799 and forced Napoleon to send against them Brune, with 30,000 men, who suppressed the rising and put an end to organized chouannerie. Eruptions of chouannerie continued till 1803, and it made its appearance once more in 1814–15. Consult: Beauchamp, *Histoire des Chouans* (Paris, 1806); Kérigant, *Les Chouans* (Paris, 1882); Moulin, *Mémoires sur la chouannerie* (Paris, 1893).

CHOUGH, chŭf (AS. *cēo,* originally imitative of the bird's note). A small crow of the genus *Pyrrhocorax,* specifically the Cornish chough, or red-legged crow (*Pyrrhocorax pyrrhocorax*), a widely distributed but very local and diminishing bird, inhabiting the high mountains of Europe, Persia, India, the north of Africa, and some parts of the British seacoasts, but almost exclusively confined to high cliffs. In these it generally makes its nests; sometimes, however, in ruined towers. Its long hooked claws enable it to cling easily to a rough rock, but it seems unwilling even to set its feet on turf. It lives in societies, like the rook. It feeds on insects, berries, grubs, and grain. It is easily tamed, becomes very familiar and forward, and exhibits in the highest degree the curiosity, pilfering disposition, and delight in brilliant or glittering objects which also characterize others of the crow family. Other species of chough are known, one, the chocard or Alpine chough (*Pyrrhocorax graculus*), being confined to the European Alps, and the others natives of Australia, Java, etc.

CHOUICHA, chou'ī-chà (Alaska). The quinnat (q.v.).

CHOULANT, shōō'lăN', JOHANN LUDWIG (1791–1861). A German physician, born in Dresden. He studied in Dresden and Leipzig and became connected with the clinics in Dresden, in which he was appointed professor of therapeutics in 1823 and director in 1828. Beginning in 1842, he acted for a number of years as head of the Academy. His published works include the following: *Lehrbuch der speciellen Pathologie und Therapie des Menschen* (1831 and several later eds.); *Handbuch der Bücherkunde für ältere Medizin* (2d ed., 1841); *Bibliotheca Medico-historica* (1842); *Die Anfänge wissenschaftlicher Naturgeschichte* (1857); *Graphische Inkunabeln für Naturgeschichte und Medizin* (1858).

CHOUQUET, shōō'kā', ADOLPHE GUSTAVE (1819–86). A French writer on music, born in Havre and educated at the Institution Massin in Paris. He lived in the United States from 1840 to 1860 and then returned to Paris, where he twice won the Prix Bordin (1864 and 1868) for works on the history of music. He was appointed custodian of the collection of instruments in the Conservatory in 1871 and in 1875 published a catalogue of them. He also wrote the

text of several cantatas, among them the *Hymne de la Paix*, the prize cantata of the Exposition of 1867. Of his literary productions the *Histoire de la musique dramatique en France depuis ses origines jusqu'à nos jours* (1873) is the most important.

CHOUSINGHA, chou'sĭng-hà (East Indian). The four-horned antelope (*Tetraceros quadricornis*) of India. It is a small brown species resembling the duikerboks and distinguished by the buck having four short smooth borns upon the forehead. These animals are not gregarious and conceal themselves in bushy places. See Plate of GAZELLES.

CHOUTEAU, shōō'tō', AUGUSTE (1739–1829). An American pioneer of French descent, born in New Orleans. Under the direction of Pierre Laclède Liguest he made the first settlement on the site of St. Louis, Mo., on Feb. 15, 1764. (See SAINT LOUIS.) He and his brother, Pierre (1749–1849), were well known as traders for many years in the West.

CHOUVACHES, chōō-väsh'ez. See TCHUVASHES.

CHOWCHOW (strictly an adjective, meaning 'mixed,' 'miscellaneous,' 'broken'; of unknown origin, usually considered pidgin English). A name most commonly used to denote a kind of mixed pickles, made originally in the East Indies and now imitated elsewhere. Among its principal ingredients may be mentioned cucumbers, onions, cauliflower, and beans all steeped in mustard. A kind of Chinese sweetmeats, consisting of odds and ends of orange peel, ginger, bamboo sirup, pumelo rind, etc., is also called chowchow. The word is also used to denote a mixture or medley of any kind or constituency.

CHOWCHOW. A Chinese domestic dog which resembles a modern Pomeranian, although much lighter in weight, with so thick, plain, and even a coat that when it is pressed down by the hand it rises again, just as a close-wooled sheep's coat will do. It has one characteristic which differentiates it from all other dogs, a black tongue. Many dogs have black roofs to their mouths, but no chowchow is of the true breed that has not a black tongue. The dog is frequently eaten by the Chinese. Two varieties have been exhibited at bench shows, one all red and the other all black, though yellow, blue, white, or other colors (not in patches) may be shown by full-blooded specimens. In all cases the tail should be curled well over the back. Consult Leighton, *The New Book of the Dog* (London, 1907). The chowchow made its first appearance in America at the Westminster Kennel Club's show in New York in 1900.

CHOW'DER (Fr. *chaudière*, pot, caldron; Lat. *caldaria*, boiling pot, from *caldus*, *calidus*, warm, hot). A savory stew of fish or shellfish cooked with pork and vegetables and thickened with crushed hard bread. The term seems to have originated in the Breton fishing villages, where *faire la chaudière* is to provide a kettle in which is cooked a stew from ingredients furnished by the fishermen, each of whom receives a share of the prepared dish. The practice seems to have been carried by the French fishers to Newfoundland, from whence it spread to Nova Scotia, New Brunswick, and New England.

CHOY'A. See CHAY ROOT.

CHRESTIEN DE TROYES, krā'tyăN' de trwä (c.1140–c.1195). A French poet, the founder of the mediæval courtly romance and one of the most important writers in French literature, both for his influence and the qualities of his new style. He was probably born in Troyes and was attached to the court not only of the Count of Champagne, his native district, but also to those of the neighboring principalities of Flanders and Hainaut. He traveled in England and died, according to Gaston Paris, in 1180, when only about 40 years of age, though Förster places his death at a much later date. Chrestien is the most famous of the authors who developed the Arthurian romances in France and expressed the spirit of the later chivalry, much more refined and approaching more nearly modern ideas than the fierce and warlike epics of the Charlemagne cycle. Arthur's court, in his hands, becomes a civilized and brilliant gathering, modeled after those with which the poet was familiar. In fact, though finding his subjects in the fantastic and ideal legends of an earlier age, he treats them most successfully when he deals with details of everyday life, which he renders with the fidelity of a modern novelist, delighting in the reproduction of scenes of pomp and ceremony to please the aristocratic society for whom he wrote. His main topic is love; and as his poems were intended for women, he is fond of describing beauty and the adornments of the toilet. He is distinctly a stylist, showing a desire to produce a definite effect through choice of expression, which, however, often causes him to fall into affectation and trifling. It is probable that to the novelist's instinct of Chrestien is due the rounding out and completion of what we may call the plot of the Arthurian story, in which case a very high place must be assigned to him among the romancers of the world. From his working in of the Grail legend (see GRAIL, THE HOLY) in his huge romance of *Perceval le Gallois* (ed. Potvin, 6 vols., Mons, 1866–71), which with its continuations by other hands extends to 63,000 lines, sprang the great epic of Wolfram von Eschenbach which furnished Wagner with the material for the libretto of *Parsifal*. His other main works, in the best editions, are *Erec et Enide* (Förster, Halle, 1896); *Yvain* or *Le Chevalier au Lyon* (id., ib., 1887; 3d ed., 1906), *Le Chevalier à la Charrette* (Jonckbloët, The Hague, 1850; Förster, Halle, 1899); and *Cligès* (id., ib., 1884). They are written in octosyllabic couplets, light, flowing, and full of charm. Consult Potvin, *Bibliographie de Chrestien de Troyes* (Brussels, 1863); Förster, *Samtliche Werke von Chrestien de Troyes* (4 vols., Halle, 1884–99); *Contes del Graal: Percevaus li galois* (Freiburg, 1909); Borodine, *La femme et l'amour au XIIe siècle* (Paris, 1909; Thüre, *Die formalen Satzarten bei Crestien von Troyes* (Marburg, 1909); Wilmotte, *L'Evolution du roman français aux environs de 1150* (Paris, 1903); Zenker, *Zur Mabinogionfrage* (Halle, 1912); and see FRENCH LITERATURE; ARTHUR; PERCEVAL.

CHRIEMHILD, or KRIEMHILD, krēm'hĭlt. See NIBELUNGENLIED.

CHRISM, krĭz'm (from AS. *chrisma*, OHG. *chrismo*, Ger. *Chrisam*, from OF. *chresme*, Fr. *crême*, It. *crisma*, Lat. *chrisma*, oil, from Gk. *χρῖσμα*, ointment, from *χρίειν*, *chriein*, to anoint). The name given to the oil consecrated on Maundy Thursday in the Roman Catholic and Greek churches by the Bishop and used in baptism, confirmation, orders, and extreme unction. There are two kinds of chrism used in the Roman Catholic church—the one, a mixture of oil and

balsam, is used in baptism, confirmation, and orders; the other, which is merely plain oil, is used in extreme unction. That in the Greek church contains many ingredients.

CHRISOM, krĭz'om (variant spelling of *chrism*). The name of the white vesture laid by the priest on the child in former times at baptism, to signify its innocence. It was generally presented by the mother as an offering to the church when she came to be "churched"; but if the child died before the mother was "churched," it was used as a shroud. By a common abuse of words, chrisom came to be applied to the child itself if it died before it was baptized. A chrisom child is a child in a chrisom cloth.

CHRIST (Lat. *Christus*, Gk. Χριστός, *Christos*, anointed, from χρίειν, *chrīein*, to anoint). The Greek term is found in the Septuagint, where it translates varied forms of the Hebrew verb *māshahh* (to anoint), most frequently the nominal form *māshīahh* (an anointed one), whence the English term *Messiah* is derived. The Hebrew conception of anointing was derived from the ancient magical idea that the application of oil endowed the person or object with certain superior and even supernatural qualities. In early Israel the custom of anointing was thus in recognition of the endowment of the person with the qualification for exalted office. It was applied, not only to the priests (Lev. iv. 3) as intermediaries between God and man, but also to the kings (1 Sam. ii. 10) as representatives of God in the theocracy and as thus assuming in their person priestly functions. Later, it was applied to the prophets (1 Kings xix. 16) and was referred to even in connection with the patriarchs (Ps. cv. 15) and with Cyrus (Isa. xlv. 1), though in these cases without any thought of its being literally understood. In the development of the Messianic thought it came to be narrowed down to the redeemer and restorer of the Jewish nation (Ps. ii. 2). The first application of this idea, in its full technical sense, to this expected King is found in the apocryphal Book of Enoch (xlviii. 10).

In the New Testament Christ is used both as an appellative and as a proper name. In both cases it occurs either with or without the article, either alone or in combination with other terms and names (e.g., Matt. xvi. 20, Mark viii. 29; Luke ii. 11, 26; ix. 20; xxiii. 2; Acts ii. 36; xviii. 5; Rom. iii. 24; xv. 3; 1 Cor. iii. 11; 2 Cor. i. 2; iv. 5; 2 Tim. i. 2). Always when used as a proper name, and frequently when otherwise used, it is a designation of Jesus of Nazareth, as the expected Messiah of the Jews. It is from this application of the term that its English meaning is derived. See CHRISTOLOGY; CHRISTIANITY; JESUS CHRIST; MESSIAH.

CHRIST, DESCENT OF, INTO HADES. See APOCRYPHA, *New Testament*.

CHRIST IN ART. See JESUS CHRIST IN ART.

CHRIST, ORDER OF THE KNIGHTS OF, IN PORTUGAL. An order instituted in 1317 by King Diniz, of Portugal (1279–1325), and endowed with property confiscated from the Order of the Templars, which was suppressed in 1312. It was founded in imitation of the Spanish orders of Alcántara (q.v.) and Calatrava (q.v.) and the regulations of the Cistercians. The new order was established "for the defense of the faith, the discomfiture of the Moors, and the extension of the Portuguese monarchy." With some difficulty Pope John XXII was induced, in 1319, to sanction the new order, but only on condition that the knights swore fealty to the Pope and that their Grand Master made a special vow of such obedience before the abbot of the Cistercian monastery of Alcobaça, one of the largest and richest then extant, who was the Pope's special representative. The knights joined in all Portuguese crusades against the infidels and also in their African and Indian expeditions, receiving in compensation continual additions to their own possessions. The Grand Prior of the order was invested by Pope Calixtus III (1455–58) with power equal to that of a bishop; and, as an encouragement to adventure, the knights were promised all the countries which they might discover, to be held under the protection of Portugal. Under such favorable conditions it is no wonder that the order became immensely rich. Its headquarters was the splendid castle of Thomar, 70 miles northeast of Lisbon, whence it had been in 1357 transferred from Castro Marino, at the mouth of the Guadiana. At length their wealth and power excited the jealousy of the kings of Portugal; their future acquisitions, and subsequently even their actual possessions, were declared to be crown possessions, and the offices of Administrator and Grand Master were transferred to the crown. Noble descent and three years' military service against the infidel were required for admission. The members took the three monastic vows of celibacy, poverty, and obedience, till Pope Alexander VI (1492–1503) released them from the first two on condition of their applying the third part of their revenues to the support of the Thomar cloister, the priests of which were bound by the three vows. In 1523 King John III turned the order into a monastic one. In 1797 it was secularized and it is now merely an honorary order. Its membership, which is restricted to Catholics of noble descent, is very large. The order was nationalized in Brazil in 1823, but was dissolved in 1890.

CHRIST, PAPAL ORDER OF. A branch of the Portuguese order created by Pope John XXII (1316–34) for Italians. It has only one class and is now merely honorary.

CHRIST, PERSON OF. See CHRISTOLOGY.

CHRIST, SECOND ADVENT OF. See SECOND ADVENT OF CHRIST.

CHRIST, krīst, WILHELM VON (1831–1906). A German classical philologist, born at Geisenheim. He was professor in the University of Munich from 1861, and was the author and editor of numerous works, of which the most important are: *Die metrische Ueberlieferung der Pindarischen Oden* (1868); *Metrik der Griechen und Romer* (Leipzig, 1879); *Attikusausgabe des Demosthenes* (1882); *Griechische Litteraturgeschichte* (4 editions, 1888, 1890, 1898, 1904); and editions of Homer's *Iliad* (1884), Pindar (1887), Aristotle's *Poctica* and *Metaphysica* (1878, 1895).

CHRISTABEL, krīs'tà-bĕl. 1. An old ballad which deals with the love of a princess, the title character, for the valiant Sir Cauline. The latter is killed in rescuing her from an Eastern potentate, and she thereupon dies of grief. 2. A poetical fragment by Coleridge (1816), a bit of haunting melody and genuine inspiration. Before its publication Scott heard lines of it recited and adopted the metre for his "Lay

of the Last Minstrel" (1805). Saintsbury finds in it a metrical resemblance to Gottfried von Strassburg's *Tristan* and Spenser's "The Oak and the Brere." Admirably adapted as is the vehicle, the story is itself of engrossing interest and is narrated with the poet's best art. A parody appeared in *Blackwood's*, June, 1819.

CHRIS'TADEL'PHIANS (from Gk. Χριστάδελφος, *Christadelphos*, having brotherhood with Christ, from Χριστός, *Christos*, Christ + ἀδελφός, *adelphos*, brother), or BROTHERS OF CHRIST. A religious sect in the United States, Canada, and Great Britain, organized by John Thomas, M.D., an Englishman, who came hither in 1844 and at first belonged to the Disciples. But being "convinced by a study of the Bible that the cardinal doctrines of the existing churches correspond with those of the apostate Church predicted in Scripture," he spread his views. Making converts, he formed them into societies, which, till the outbreak of the Civil War, had no distinctive name, but the one now held was selected when their members claimed exemption from military duty on the ground of conscientious opposition to war. The principles of the sect are thus stated: The Old and New Testaments are equally important; God will restore to immortal life all who love Him in this life, but those who have not accepted this immortal principle cease to exist at death; there is no personal devil; Christ is the son of God, deriving from the Deity moral perfection, but from His mother a human nature; He has the threefold character of prophet, priest, and king; the first office He fulfilled by His life and death on earth, and now as priest He mediates before the Deity; as king He will return to earth and reign over all the world from the throne of David in the Holy Land. In 1913 the Christadelphians had in the United States 70 organizations and some 1400 members. They reject the doctrine of the Trinity, practice immersion, and have no ordained ministry. Consult H. K. Carroll, *The Religious Forces of the United States*, pp. 89–90, 454 (New York, 1896), and *Religious Census of the United States* (1910).

CHRIST AMONG THE DOCTORS. A painting by Ingres. It hangs in the Musée Municipal, Montauban, France.

CHRIST'CHURCH'. A parliamentary and municipal borough and seaport on the English Channel, in Hampshire, England, at the head of the estuary formed by the Avon and Stour, 24 miles southwest of Southampton (Map: England, E 6). The priory church, partly of Norman and partly of early English architecture, one of the most interesting and beautiful of English ecclesiastical structures, dates from the reign of William Rufus and was restored in 1861. It contains a very interesting monument to the poet Shelley. The parliamentary borough comprises two favorite watering places, Muddiford and Bournemouth, and returns one member to Parliament. Christchurch Bay has a double tide every 12 hours. Christchurch was known in Saxon times as Tweonæteam, but took its present name from the Augustinian abbey of Christchurch, founded here before the Conquest. Pop., 1891, 4000; 1901, 4200; 1911, 5104. The church contains a monument to Shelley.

CHRIST'CHURCH'. The capital of the Province of Canterbury, South Island, New Zealand, situated on the river Avon, about 8 miles from the sea (Map: New Zealand, South I., D 4). Its port is Lyttelton, with which it is connected by a railway. It is the centre of a great grazing district and also has flourishing manufactures—boots, clothing, furniture, and agricultural implements being perhaps the chief. There is a large export trade, mainly in timber, frozen mutton, and wool. The city possesses numerous fine public buildings, churches, including a fine reproduction of Caen Cathedral, France, a museum, a theatre, an opera house, Christ College, high schools, parks, and pleasure grounds. The city has electric tramways and owns an abundant artesian-well water supply. The United States is represented by a consular agent. Christchurch is the see of the New Zealand bishopric of Canterbury. The city owes its foundation to the Canterbury Association, a society of influential men which included the Archbishop of Canterbury, Lord Lyttelton, and other prelates and peers. Each of its streets bears the name of an Anglican diocese. In 1903 several suburbs were annexed to the city. Pop., with suburbs, 1901, 17,537; 1911, 80,193.

CHRIST CHURCH. A college at Oxford, England, the magnificent project of Cardinal Wolsey when, as the minister of Henry VIII, he was the most powerful man in England next to the King. The foundation was to be known as Cardinal College and was to have in connection with it a school in Ipswich, Wolsey's native town. The plans for the college were drawn, and the building begun in 1525, but with the fall of the Cardinal in 1529 and his death in 1530 the whole project fell to the ground. In 1532, however, Henry VIII took up the work, refounded the college on a smaller scale under the name of King Henry the Eighth's College, and in 1545–46 he again reconstituted it under the name it now bears, and united it with his newly established see of Oxford by the removal of the episcopal establishment from Osney Abbey to Christ Church. He thus formed a unique union of cathedral and college, from which the foundation was called *Ædes Christi*, or the 'House of Christ.' It is spoken of generally as the "house," not the college, and the incumbents are referred to as the dean and chapter, not of Oxford, but of Christ Church. The original foundation was for a dean, 8 canons, 8 clerks, a schoolmaster, 100 students, choristers, and an organist. In accordance with the few changes of 1882 there were a dean, 6 canons, 31 senior students (i.e., fellows), 2 lecturers, a number of honorary students, 60 scholars, and 29 exhibitioners, besides 6 chaplains, the whole forming the largest collegiate establishment in Oxford. The modern spirit of reform was introduced by one of the most famous deans of the college, Dean Liddell (1855–91), who was also responsible for the restoration of and additions to the college buildings. In 1913 it had 326 undergraduates. The buildings about the great quadrangle (Tom Quad) include the cathedral, which occupies the site and contains some of the work of the Saxon nunnery of St. Frideswide, and the Hall, with the exception of the Hall of William Rufus at Westminster, the most splendid example of its kind in England. Christ Church is one of the foremost colleges in Oxford and has always been famous for its distinguished members. Among these may be mentioned five prime ministers of England in the nineteenth century—Canning, Peel, Gladstone, Salisbury, and Rosebery. Of the other political worthies may be noted Arlington, Nottingham, Godolphin, Bolingbroke, Carteret, Wyndham, Grenville, Sir

G. C. Lewis, Lord Elgin, and Lord Dalhousie. Christ Church has had on its books, besides these, such names as Lyttleton, Mansfield, John Locke, William Penn, Ben Jonson, Camden, Sir Philip Sidney, John and Charles Wesley, Dr. Pusey, and Ruskin. Consult H. L. Thompson, *Christ Church* (London, 1900).

CHRISTEN, krē'sten, ADA. See BREDEN, CHRISTIANE.

CHRISTENING, krĭs'en-ĭng (from AS. *cristenian*, to Christianize, baptize, from *cristena*, Christian, from Lat. *Christianus*, Gk. Χριστιανός, *Christianos*, Christian, from Χριστός, *Christos*, Christ). A term often used as equivalent to baptism (q.v.).

CHRISTENING A SHIP. The present custom of christening ships doubtless grew out of the ancient libations practiced when ships were launched. The action of blessing ships is alluded to by the monks of St. Denys. In July, 1418, the Bishop of Bangor was sent to South Hampton to bless the King's ship, the *Grâce à Dieu*, and received £5 for his expenses. The christening is ordinarily performed by a lady, who breaks a bottle of wine against the stem as the ship starts down the ways in launching and at the same time utters the christening words. In the Russian navy the christening ceremony is performed by a priest and takes place at some convenient time subsequent to the laying of the keel. At the conclusion of it a silver plate bearing the name of the ship, date of christening, etc., is affixed to the keel.

CHRIS'TIAN. The name of the hero of Bunyan's *Pilgrim's Progress*.

CHRISTIAN II (1481–1559). King of Denmark and Norway from 1513 to 1523 and of Sweden from 1520 to 1523. He was born at Nyborg, on the island of Fünen, July 2, 1481. As Crown Prince he distinguished himself in 1502 by the implacable cruelty with which he suppressed a Norwegian insurrection. As King he favored merchants, artisans, and peasantry and deprived the nobility of many of their exclusive privileges. In 1520 he succeeded by force of arms in recovering Sweden for the Danish crown, marked his success by the execution in Stockholm of 94 men of high rank, and followed this up with sweeping executions throughout the country. His severity hastened the approach of the successful revolt of Sweden under Gustavus Vasa, which seated the latter on the Swedish throne in 1523. On his return to Copenhagen Christian found the clergy and nobles of Jutland also in open rebellion, and in April, 1523, he fled to the Netherlands with his wife and children, calling upon the Emperor Charles V, his wife's brother, for assistance. Frederick of Holstein, uncle of Christian, took possession of the kingdom, supported by the clergy and nobles, but stoutly resisted by the burghers and peasantry. Aided by the Dutch, Christian made a final attempt to recover his throne, landing in Norway in 1531, but was defeated and made a prisoner in 1532, and remained until his death, Jan. 25, 1559, a captive in the castle of Sonderborg, on the island of Alsen. See DENMARK; NORWAY; SWEDEN.

CHRISTIAN IV (1577–1648). King of Denmark and Norway from 1588 to 1648. He was born, April 12, 1577, in Frederiksborg, Zealand. In 1611–13 he carried on a war against the young Gustavus Adolphus of Sweden and gained some territory. In the second period of the Thirty Years' War (1625–29) an exaggerated military reputation and England's support made him the leader of the Protestants, but only disaster resulted. His forces were overwhelmed by Tilly at Lutter in 1626. He was driven back into Jutland, which was overrun by the enemy, and in 1629 made peace with the Emperor Ferdinand II at Lübeck. Soon after his Swedish rival became the Protestant leader. He waged war with Sweden unsuccessfully from 1643 to 1645. In civil affairs, however, he proved himself a capable sovereign, introducing financial and legislative reforms, encouraging industry and science, and giving a powerful impetus to both the external and the internal trade of his kingdoms. The present capital of Norway was founded by him and bears his name. See DENMARK.

CHRISTIAN VII (1749–1808). King of Denmark and Norway from 1766 to 1808. He succeeded his father, Frederick V, in 1766. He was miserably feeble and incapable and scarcely exercised any influence in the government. During his reign the reforms carried out by his ministers, Struensee in particular, were profuse, though hasty. The actual power was wielded successively by his ministers, Bernstorff and Struensee, and his son Frederick, who became joint regent with his mother, Caroline Matilda, sister of George III of England, in 1784, and upon the death of Christian assumed the title of King Frederick VI (q.v.). Christian died March 13, 1808. Consult Reverdil, *Danmarks Riges Histoire*, vol. v (Copenhagen, 1897–1905).

CHRISTIAN VIII (1786–1848). King of Denmark from 1839 to 1848. He was a nephew of Christian VII and was born Sept. 18, 1786. When Norway was ceded to Sweden by the Treaty of Kiel, the people of the former country repudiated the act of alienation, and Prince Christian was made Governor. He raised an army and convened a diet, at which a constitution was framed, and he was elected, May 29, 1814, King of Norway under the title of Christian I; but the Norwegians were unable to withstand the invading Swedish army under Bernadotte, and the Allied Powers compelled Christian formally to relinquish the throne on October 10. He succeeded Frederick VI as King of Denmark in 1839. His reign was characterized by industrial progress and by increased political liberty. He made many significant administrative reforms, though in unifying his dominions into a firm whole he was less successful. Consult Thiele, *Christian den Ottende* (Copenhagen, 1848).

CHRISTIAN IX (1818–1906). King of Denmark from 1863 to 1906. He was born April 8, 1818, the fourth son of Duke William of Schleswig-Holstein-Sonderburg-Glücksburg. As the male line of the house of Oldenburg, which had occupied the Danish throne since 1448, was approaching extinction in the person of Frederick VII, the Powers, by the Treaty of London, May 8, 1852, to maintain the integrity of the Danish monarchy, "as connected with the general interests of the balance of power in Europe," guaranteed the succession to Prince Christian, by right of his wife, who was a niece of King Christian VIII. The London agreement was ratified by the Danish Diet by the Act of Succession of July 31, 1853. Accordingly Christian became King on the death of Frederick, Nov. 15, 1863. Soon after his accession the trouble over the duchies (see SCHLESWIG-HOLSTEIN) reached an acute stage, and Denmark

was compelled to relinquish them in 1864, after a brief war with Austria and Prussia. From 1873 to 1894 the King was engaged in a constitutional conflict with the democratic parties over the question of the responsibility of the ministry. The Conservatives finally triumphed. Victory lasted but a brief space of time. In 1901 the Liberals won out at the general elections, and a Liberal government was established in Denmark, much to the joy of the radical wing. Its success was not so great as expected, though the policy of reform was stimulated anew. By his wife Louise, a princess of Hesse-Cassel (1817–98), he had six children. Of these the eldest, Frederick, succeeded him on the throne as Frederick VIII; Alexandra married the Prince of Wales, later Edward VII; Dagmar married the Grand Duke Alexander of Russia, later Alexander III; and George became King of Greece as George I. His grandson, Charles, became King of Norway in 1905, as Haakon VII. The popularity of Christian IX was ever growing, due to his honorable and unassuming nature. Sound of judgment and loyal to the constitution, he won the love of his subjects and the respect of the other European nations. Consult Barford, *Kong Kristian IX's Regerings-Dagbog* (Copenhagen, 1876), and Majestet, *Kong Kristian IX* (ib., 1888).

CHRISTIAN X, Carl Frederik Albert Alexander Vilhelm (1870–). King of Denmark. He was born at Charlottenlund, Sept. 26, 1870, the son of King Frederik VIII. He married Alexandrine, Duchess of Mecklenburg, in 1898. He has two sons—Frederik, the Crown Prince, born in 1899, and Knud, born in 1900. Christian X succeeded his father to the throne of Denmark, May 14, 1912.

CHRISTIAN, of Brunswick (Braunschweig-Wolfenbüttel) (1599–1626). A German prelate and soldier, Lutheran Bishop of Halberstadt, and general in the Thirty Years' War, styled "the Madman of Halberstadt." He was born in Gröningen (Saxony) and became Bishop of Halberstadt in 1616. His military training he obtained in service in the Netherlands, under Maurice, Prince of Orange, against the Spanish. After Frederick V, Elector Palatine (q.v.), had lost Bohemia and the Palatinate through the disastrous battle of White Hill, Christian offered his sword in defense of the electoral cause, and in 1621, with an army of 15,000, plundered Roman Catholic churches and religious establishments along the river Main and through Westphalia. He was defeated by General Tilly at Höchst in June, 1862, and was dismissed from Frederick's service by the Elector. Immediately he joined the forces of the United Provinces, and as a commander under Prince Maurice defeated the Spaniards at Fleurus (in the modern Province of Hainaut, Belgium). Afterward he returned to Lower Saxony and was signally defeated by Tilly at Stadtlohn (Aug. 6, 1623). With English and French assistance he and Count Mansfield took the field in 1625, in command of an army of 14,000, under the general direction of King Christian IV of Denmark, the Protestant leader. He died, however, before anything was accomplished. See Thirty Years' War.

CHRIS'TIAN'A. The wife of Christian in Bunyan's *Pilgrim's Progress.* She is left in the City of Destruction by her husband. In the second part of the allegory she also leaves that place, and her subsequent adventures form the chief interest of the plot.

CHRISTIAN ART (Early). All art in the service of the Christian Church and religion is Christian art. By general usage the term "early Christian" is restricted to those phases of that art which belong to the period before the year 800, when Charles the Great was crowned Emperor of the West. It is therefore Christian art before its mediæval form was developed, while it still retains much of antique tradition. It falls into three divisions: (1) pre-Constantinian (c.100–313); (2) from Constantine to Justinian (c.312–550); (3) Justinian to Charlemagne. The first period is mainly illustrated by the Roman catacombs and shows Christian art in embryo; the second can be studied principally in the great basilicas and other churches of Italy, though the few examples at all well preserved in the East show that art was there quite as advanced; the third is illustrated in both East and West, but its Eastern phases are commonly classed under the term "Byzantine" (q.v.).

Architecture. There was very little opportunity for anything characteristic in the architecture of the earliest Christians. Constantine in 313 gave Christians freedom to erect places of worship. All that remains of early Christian art before this date is described in the article on Catacombs. The style formed in the fourth century is called basilical, because this name was given to the large churches that were by far the most important monuments erected. Christian architects faced the problem of creating a large interior for worshiping multitudes, in contrast with ancient worship, which was in the open air, or carried on individually or by sacrifices in the temples. In pagan temples nearly all the artistic efforts had been concentrated on the exteriors. Christian art neglected the exterior, leaving it of bare brick, conditioned in its form entirely by the interior arrangement and proportions. The arrangements of these churches are elsewhere described. (See Basilica; Apse; Transept; Atrium; Nave; Aisle; Altar; Choir; Confession.) Structurally they were of little importance. No rivalry with the great domed and vaulted halls of the Roman Imperial baths was attempted. The interiors were roofed with wood, and the thin brick walls had simple doors and windows. The general composition was good—columnar vestibule to a high, encircling wall; square open court, or atrium; open porch with three doors leading into an oblong interior divided into three or five aisles by rows of columns, supporting either a straight architrave or a line of arches. The dominant note of the interiors was not form, light, and shade, but color, given by mosaic pictures (see Mosaic) or frescoes (see Fresco) on the upper part of the walls, marble veneer or wainscot on the lower part, elaborately patterned marble floors, and rich hangings between the columns. This is what might be termed the official style, prevalent throughout Italy and in Greek lands, but elsewhere other ideals prevailed. The following schools may be distinguished: 1. *Roman*—in Rome, Milan, and most Italian cities; in southern Gaul; and in Rhenish Germany. 2. *Græco-Roman*—with decided Hellenic and Oriental influences, in several cities of Italy, where this element was strong, as in Ravenna and Naples; in the Adriatic provinces of

Istria and Dalmatia; and in Greece proper and the Balkan Peninsula. 3. *Asia Minor*—with use of stone and of vaulting, with heavier proportions and differences in plan. 4. *Syria*—especially in the ruined cities of the Hauran, and regions of Antioch and Damascus, where stone styles of great originality were developed. 5. *Egypt*—where the Christian Copts drew both from ancient Egyptian and from Hellenic Christian models. 6. *Northern Africa*—especially the present Algeria and Tunis, where the French excavations have brought to light a large number of early churches, but all in ruins. In these schools the earliest works were nearly always the finest, because in the fourth century the Roman Empire was still comparatively flourishing, and Imperial funds were lavishly used in building and decorating churches. The Church itself was far richer than during the barbarian inroads. The early Christian style lasted much longer in the West than in the East or in Greece, because the decay in the West caused by the barbarian invasions prevented the developments and changes that were possible in the East, where civilization continued uninterruptedly at a high level. In Italy, Gaul, Spain, and Germany it ruled far into the Middle Ages, the basilical type of church prevailing in many parts until the twelfth century. But in the Orient, where it never had so uniform a type, it gradually gave way to what is termed the Byzantine style. In Salonica (Thessalonica), which came next to Constantinople as a Greek centre, the wooden-ceiled churches continued to be built side by side with the domical ones until the eighth and ninth centuries. But elsewhere, as early as the seventh century, the flimsier wooden-roofed style had been entirely superseded by the Byzantine vaulted structures. The following are some of the basilicas which remain wholly or in part: In Rome—Santa Maria Maggiore (fifth century), San Paolo fuore le Mura (fifth), Santa Sabina (fifth), San Pietro in Vincoli (fifth), San Lorenzo (sixth, old part), Sant' Agnese (seventh), Santa Maria in Cosmedin (eighth), Santa Prassede (ninth), San Martino ai Monti (ninth). In Ravenna—San Teodoro (fifth), San Francesco (fifth), San Apollinare Nuovo, San Apollinare in Classe (sixth). In Spoleto—San Agostino. In Perugia—San Pietro. Also on the Adriatic, basilicas in Parenzo, Pola, Grado, all of the sixth century. In Constantinople—St. John (fifth). In Bethlehem—church of the Nativity. In Salonica—St. Demetrius. In Syria, such a multitude of churches, from the basilica of Shakka, in the fourth century, to the church of St. Simeon, in Kalat Siman, in the sixth century, that enumeration would be impossible. In nearly all these buildings, and in many others of less importance or poorer preservation, the one official type (see BASILICA) is followed. The differences are mainly in the common use by Greek and Eastern churches of the gallery for women over the side aisles, of double capitals over the columns, of polygonal apses, and of a modification of the old Corinthian and Ionic orders that led up to Byzantine ornament. In fact, from the beginning, architecture in the East was tending towards the Byzantine. If one were to select a half dozen out of all the remaining early basilicas as the finest and best-preserved examples of the style, these would be: church of the Nativity, Bethlehem; Santa Maria Maggiore, Santa Sabina, and Santa Prassede, Rome; the two San Apollinares in Ravenna; and the cathedral in Parenzo. They have preserved a great part of their original decoration as well as their architecture. There was another important class of early Christian buildings—the baptisteries, chapels, sacristies, mausoleums, and other religious structures, that were built not on an oblong, but on a concentric plan, i.e., buildings that were circular, polygonal, or even equilaterally cruciform. These buildings are, of course, comparable to Roman structures like the Pantheon or the temple of Vesta or Minerva Medica, but they were never so bold nor on so large a scale. At first even churches were sometimes built in this form (Antioch; San Stefano Rotondo, Rome; St. George, Salonica); but this was found inconvenient for liturgical reasons, and it was thenceforth confined to other religious and funerary structures. Some were square externally and octagonal internally, by means of niches, like the two baptisteries in Ravenna and that in Kalat Siman; some purely circular, like St. George in Salonica. In these cases the dome rests upon the outer wall, but in the more developed and monumental examples it rests upon a row of columns and is surrounded by a concentric aisle imitated from the straight aisles of the basilica and covered by a lower roof. Sometimes both dome and aisles are of masonry, as in Santa Costanza in Rome and Santa Maria Maggiore in Nocera—both of them of circular plan; at other times, with lighter walls and higher proportions, the coverings are of wood, as in the Lateran baptistery in Rome, which is octagonal, and San Stefano Rotondo, which is circular and with two aisles. This type of masonry vaulted "concentric" building was adopted in the East for church use: by the use of pendentives (q.v.) and the addition of an apse the Eastern architects produced a fine church type that was the germ of the Byzantine style. This is the case with the cathedral of Bozra and St. George in Ezra in Syria, and with Saints Sergius and Bacchus in Constantinople. Some of these buildings have galleries over the aisles.

For civil buildings of this period we must go to the Syrian cities, where there remain thousands of houses, halls, colonnades, sepulchral monuments, all well built in stonework, and telling us as much of the life of that time as Pompeii does for the previous centuries.

In so far as *materials* of construction are concerned, bricks were the common material in the West, including the Greek provinces, and this precluded sculptured decoration, because no marble facing was used. But in parts of the Orient, especially in Syria, local stone replaced brick, and there is a great deal of good carved detail. Here also the normal types of the classic orders, slavishly followed farther west, are varied by many new forms, which are not only connected with Persian and Byzantine ornament, but seem to foreshadow Romanesque and Gothic foliage and ornament. It is in Syria also that the greatest variety and inventiveness of architectural plan, composition, and form are shown. The masterpiece of the school is the monastery of St. Simeon in Kalat Siman.

Bibliography. For systematic treatment: Holtzinger, *Die altchristliche Architektur* (Stuttgart, 1889); Dehio and Von Bezold, *Die kirchliche Baukunst des Abendlandes* (ib., 1887–1901); Esenwein, *Der christliche Kirchenbau* (Frankfort-on-the-Main, 1886), and *Ausgänge*

der klassischen Baukunst (Stuttgart, 1889); Kraus, *Geschichte der christlichen Kunst* (Freiburg, 1896); and for plates: Hübsch, *Die altchristlichen Kirchen* (Karlsruhe, 1862–63); also French edition, *Monuments de l'architecture chrétienne* (Paris, 1860); for Syria: De Vogüé, *Syrie Centrale; Les églises de Terre-Sainte* (Paris, 1865); Von Quast, *Die altchristlichen Bauwerke zu Ravenna;* Butler, *Architecture and Other Arts in Northern Central Syria* (New York, 1903); Hill, *Architectural History of the Christian Church* (London, 1908); Browne, *Early Christian and Byzantine Architecture* (New York, 1912).

Sculpture. The earliest of the arts to fall, at the decline of the Roman Empire, was sculpture. The carvings on the Arch of Constantine, the Column of Theodosius at Constantinople, and the Imperial portraits of the fourth century show this to have been so, even in the case of the most pretentious monuments. A few works of Christian sculpture of pre-Constantinian date come before this complete decadence. Such are the statue of St. Hippolytus and that of the Good Shepherd in the Lateran Museum and a few of the sarcophagi (q.v.). The latter form the bulk of early Christian marble sculpture during the third, fourth, and fifth centuries, after which there was very little sculpture on a large scale of any sort. These sarcophagi, after the fashion of the earlier ones of the Etruscans and pagan Romans, had a line of reliefs covering face and sides. Sometimes, even, there were two superposed rows of figures. Many subjects were usually crowded together, though sometimes such scenes as the crossing of the Red Sea, or Jonah swallowed by the whale, occupy the entire front. The scenes are selected with evident relation to funerary ideas and belief in future life, and are thus very instructive. (See ICONOGRAPHY.) Most of them occur also in the catacomb frescoes. The technique begins to decline in the fourth century, as is shown by the liberal use of the trepan, the loss of finish, and of good proportions. The museum of the Lateran contains the largest collection, but there are many in Arles. In fact, throughout the Roman world a similar style prevailed. The sarcophagi in Ravenna show the stiffness and limitations of the latest sarcophagi—those of the fifth and sixth centuries. To this time probably belongs the last colossal statue of antiquity—the bronze emperor found at Barletta, hard in its style, showing the loss of ability since the time of the famous bronze statue of St. Peter in the Vatican (fifth century). After the sixth century no attempt was made at monumental sculpture, the religious scruples of the Iconoclasts hastening the total downfall, which was complete both for the East and the West. The eclipse was to last about six centuries.

Painting and Mosaics. The painted ornamentation of the earliest crypts in the Roman catacombs, such as those of Domitilla and Priscilla, show that not until the middle of the second century was there enough that was significantly Christian to be called Christian painting. The technique is exactly the same as in contemporary pagan monuments; but a system of symbolism to express Christian faith is in process of formation. (See ICONOGRAPHY; a more general description is given under CATACOMBS.) Everything that could be regarded as a symbol of the resurrection and of salvation was represented, whether in the form of animate and inanimate symbols, such as the phœnix, the fish, or the bread; or of symbolic scenes, such as Noah, Daniel, or the three children in the furnace. In its limitation and simplicity this art was very direct and appealed alike to learned and unlearned. After the time of Constantine the historic, descriptive, genre, and dogmatic elements were added to diversify the art, while the deterioration of technique detracted from its appeal. The catacombs continue throughout the fourth century to furnish practically the entire material for study, because the churches of this period still in existence have partly or entirely lost their paintings. The art of mosaic painting now entered the field of figured composition and rapidly displaced fresco painting in the larger and richer churches. The mausoleum of Constantia and the church of Santa Pudentiana in Rome preserve works of this century of very different character—the former, in its semipagan decoration, harking back to the early catacombs, while the latter, with its ordered scene of Christ enthroned teaching the Apostles and establishing the Church of the Jews and of the Gentiles, shows the new dogmatic and didactic tendency. While painting had been rather sentimental and free, it became now more systematically a religious handmaid. (See ICONOGRAPHY.) The desire to tell the people all the main facts of religious history led to the invention of a series of chronological illustrations of the events of the Old and New Testaments which, originating as early as the fifth century, were handed down, almost unchanged, for about 1000 years. The mosaics of Santa Maria Maggiore in Rome, with their scenes from Genesis (c.430), show the early phase of the style before its historic exuberance had been pruned to the selection of fewer types. The historic series soon became subordinate to the dogmatic, as in the later mosaics (c.500) in San Apollinare Nuovo, in Ravenna, portraying the life of Christ. This was due to the influence of the East and of Greece. Although nearly all the preserved works of painting and mosaic earlier than 800 A.D. are found in the West, there are abundant proofs that the change from the symbolic to the dogmatico-historic style was due to the Orient. One of these proofs is the series of Greek illuminated manuscripts of the fifth and sixth centuries, in which this style is fully developed, and which may have served as models to the Western painter—such were the Vienna and Colton Genesis, Rossano Gospels, etc. The Oriental love of color also dictated the replacing of the thinner, colder fresco by the richer, warmer mosaics. The two typical Italian schools are Rome and Ravenna—the former representing the Latin, the latter the Oriental-Hellenic current. In Rome the mosaics of Santa Sabina (fifth century) and Santi Cosmo e Damiano (c.530) are the finest of their class—genuinely Roman; but the invasion of Byzantine methods is shown a little later in San Teodoro and even more in San Venanzio. The Ravenna series is richer in the fifth and sixth centuries, with its two churches of San Apollinare, San Vitale, the two baptisteries, the archiepiscopal palace, and the tomb of Galla Placidia, filled with mosaics by the best artists of the Greek school. The use of the gold ground, which they made popular, revolutionized mosaic painting and made its figures as clean-cut as those of a Greek frieze. The period closes with the supremacy of the East in painting.

Minor Arts. The smaller branches of art appeared to feel the decadence the least. This was especially true of ivory carving (q.v.) and metal sculpture. Yet in the diptychs and triptychs of the sixth to the ninth century, and in the ivory throne of Bishop Maximian at Ravenna, there is fine decorative effect, though the carving of figures is inferior. One branch, that of illuminated manuscripts (q.v.), may even be said to have been created at this time. The subjects portrayed were the same as in the larger arts. Certain branches were especially popular in special localities. Figured woven stuffs were worn in the Orient, especially in Egypt, St. Asterius commenting on the personages who carried all the Old and New Testaments on their garments. Many such textiles have been found in the Fayum. Then there was the special industry of figures delicately outlined in gold on glass, as in so many cups found in the Roman catacombs. The earthenware and bronze lamps also were decorated with religious scenes. But the choicest remaining examples are the ivories and illuminations. The scenes carved on the diptychs were necessarily limited in character to the figures and functions of the consuls; but a greater variety appears in the boxes (pyxes), the book covers, and other objects of ecclesiastical use, carved with great skill throughout this period, but especially between the fourth and the close of the sixth century, which is also the golden age for illuminations.

Symbolism and Iconography. All early Christian figured art expressed or taught some religious truth and was not produced primarily for æsthetic reasons. Therefore the study of its subjects is even more interesting than that of its style. This is treated under the title ICONOGRAPHY, as well as under SYMBOLISM; ALLEGORY.

Bibliography. Besides the authorities referred to under CATACOMBS and ICONOGRAPHY, such as Garrucci, Perate, De Rossi, etc., consult: Kraus, *Geschichte der christlichen Kunst* (Freiburg, 1895–97); Woltmann and Woermann, *Geschichte der Malerei* (Leipzig, 1879); Zimmermann, *Giotto und die Kunst Italiens* (ib., 1899).

CHRISTIAN BROTHERS COLLEGE. A Roman Catholic institution in St. Louis, Mo., conducted by the Brothers of the Christian Schools (q.v.). The college was chartered in 1855 and maintains collegiate, scientific (civil and mechanical engineering), commercial, and preparatory departments. The value of the college buildings and grounds is about $650,000, and the total annual income $40,000. The library contains about 22,400 volumes. The student enrollment in all departments in 1912 was about 400. President, Brother Lawrence Sixtus.

CHRISTIAN CATHOLIC CHURCH. A religious denomination organized in 1896 by the Rev. John Alexander Dowie, a former Congregational minister in Australia. He went to the Pacific coast of the United States and then to Chicago, preaching and practicing faith healing, and he soon attracted a large following. While the generally received principles of the Christian religion are taught and the sacraments are recognized in the Christian Catholic church, special prominence is given to the doctrine of the divine cure of disease in answer to prayer. Dowie claimed for himself extraordinary powers of healing, and these claims he based on the asserted fact that he was a reincarnation of the prophet Elijah. The chief centre of the denominational activities is at Zion City, near Chicago, where Dowie acquired large properties, and where many institutions and business enterprises are located. He established schools and a college. The business enterprises founded by him included a printing and publishing house, a general store, lace making, and other industries. To establish his lace-making enterprise he purchased the complete plant of several lace factories in Dublin and brought over the employees of these plants to operate the enterprise and to instruct others in the making of lace. Dowie was very successful in these enterprises and in his effort to gather believers until 1903, when he led a large number of his followers to New York City for the purpose of carrying on a missionary campaign. This was a failure. He was received with ridicule by the press of the city, and his meetings were attended chiefly as a matter of curiosity. He made few converts. This was followed by disastrous visits to England and Australia. Upon his return to the United States he found considerable opposition to his leadership, and on Feb. 8, 1906, he was deposed and W. G. Voliva became Overseer. Dowie died in 1907. Following his death the importance of the church as a religious movement continued to decrease, while Zion City continued to develop as an industrial community. Two factions developed —those who held strictly to the rules and regulations for spiritual and social government as set down by Dowie, and those, chiefly newcomers to Zion City, who wished more liberal laws for the government of the community and found little significance in the set rules for conduct hitherto in force. This division resulted in financial difficulties, and in 1910 certain of the enterprises of Zion City were put up at auction and were purchased by Marshall Field and Company. The most important of these were the lace factories.

A usual feature of the meetings of the members of the denomination is a united consecration service at its close. Baptism is administered to believers by trine immersion. The organization of the church comprises the General Overseer, the Overseers for the largest districts, and Seventies. Besides the United States and Canada, the church claims to be represented in England, Scotland, Ireland, Australia, New Zealand, China, and Japan. There are no figures for membership later than 1906. At that time the communicants numbered 5865, the churches 17, and the ministers 35. The chief organs are the *Leaves of Healing*, a weekly, and the *Little White Dove*, a weekly. Consult: J. A. Dowie, *A Voice from Zion* (Chicago); *Zion's Conflict with Methodist Apostasy* (Chicago, 1901); Carroll, *Religious Denominations of the United States* (rev. ed., 1912).

CHRISTIAN CHURCH, SOUTH. See CHRISTIANS.

CHRISTIAN CONVENTION. See CHRISTIANS.

CHRISTIAN ENDEAVOR, YOUNG PEOPLE'S SOCIETY OF. A society originated by the Rev. Francis E. Clark, pastor of the Williston Congregational Church in Portland, Me. Its first membership consisted of about 50 boys and girls, who met, Feb. 2, 1881, in the pastor's parlor and pledged themselves to attend and take some part in a weekly prayer meeting and

once a month to hold a consecration meeting. Other duties, social, religious, literary, and of various kinds, were assigned to different members. The idea met with instant acceptance. In 1913 there were 75,063 societies, of which 53,417 were in the United States and Canada and 21,646 in other lands. The total membership was about 3,753,000. More than 100,000 societies under different names, with over 5,000,000 members, are organized on the plan of the Christian Endeavor. These scattered organizations are bound together by a corporation, the United Society of Christian Endeavor, organized 1885, with headquarters in Boston, and managed by a board of trustees. The organ of the society is the *Christian Endeavor World*. In 1895 the World's Christian Endeavor Union was formed. For details, consult L. W. Bacon and C. A. Northrup, *Young People's Societies* (New York, 1900), and Clark, *Christian Endeavor in all Lands* (Boston, 1906).

CHRISTIAN ERA. See CHRONOLOGY.

CHRISTIANIA, krĕs'tĕ-ä'nĕ-à, or **KRISTIANIA.** The capital of Norway, situated at the north end of Christiania Fiord, in lat. 59° 55′ N. and long. 10° 43′ E. (Map: Norway, D 7). It occupies about 7 square miles. Christiania is composed of the well-built city proper and of a number of rapidly growing suburbs. There are broad streets and fine, large squares adorned with monuments. The promenade of St. John's Hill is one of the city's attractive features. The historic citadel of Akershus now serves as an arsenal and prison. The most noteworthy churches are the Gamle Akers Kirke, mentioned before 1150; the Trinity Church, erected in the Gothic style in 1853-58; the church of Our Saviour, consecrated in 1697 and recently restored; and the Johannes Kirke, completed in 1878. The more prominent secular buildings are the Parliament House, the Museum of Art, the exchange, the royal palace, constructed in 1825–48, the episcopal residence, and the university. (See CHRISTIANIA, UNIVERSITY OF.) The botanical garden and astronomical observatory are worthy of mention.

Christiania forms a separate official district and is administered by a magistracy composed of the burgomaster and two councilmen. It has good water works and several electric-car lines. The educational institutions include, besides the university, two higher military schools, a gymnasium, a technical school, and a number of Latin schools and *realschulen*. The Museum of Art contains many meritorious paintings by Scandinavian and foreign artists, but no great masterpieces. The Industrial Art Museum has fine ancient and modern specimens of Norwegian handicraft. There are three theatres and a municipal library of about 55,000 volumes.

Industrially Christiania is quite important. Among its leading manufactured products are paper, oil, cotton yarn, tobacco, furniture, ironwares, and liquors. It is the principal seaport of Norway, handling about half of the imports and nearly one-fifth of the exports. The harbor is very spacious and is kept open in winter by means of ice breakers. There is regular steamship communication with Great Britain, Germany, the Netherlands, and France, as well as with Denmark and Sweden. Christiania is the seat of a number of consular representatives, including one from the United States. The population, almost wholly Protestant, was 227,626 in 1900, 241,834 in 1910, and 247,588 in 1912. The environs are very attractive, offering magnificent views. The average annual temperature of Christiania is 42° F. The city was founded in 1624 by Christian IV, on the site of the town of Oslo, which dated from 1048 and was burned in 1624. Consult Annéus, *La ville de Kristiania, son commerce, sa navigation et son industrie: Résumé historique* (Christiania, 1900).

CHRISTIANIA, UNIVERSITY OF. The Norwegian State University. During the union of Norway and Denmark, the Norwegian students frequented the university at Copenhagen; but the awakening of the national spirit at the end of the eighteenth century finally compelled the foundation of the Christiania University, under Frederick VI in 1811–12, mainly through voluntary subscriptions. In the course of the nineteenth century many buildings have been erected, both by the state and by private contributions. The university is under the control of the Minister of Religion and Education. There were in 1912–13 about 1600 students. The library is large, containing 495,000 volumes. The university has a botanical garden and an observatory, besides various laboratories and museums.

CHRISTIAN'ITY (from OF. *Crestiente, Crestientet*, from Lat. *Christianitas*, Christianity, from *Christianus*, Christian). The religion which has grown out of the teaching of Jesus Christ and which looks to Him as the great revelation of the character of God and of the ideals of human life. It exhibits a peculiarly wide variety of forms, only Buddhism being able to compare with it in this respect. At first sight it would seem that there is little in common between, e.g., the elaborate ritualistic religion represented by the Greek church and the simple, bare individualism of the Quakers. Beneath the surface, however, it is easy to see that there is a broad common ground. This consists in the acceptance of Jesus as the revealer of God and of the way of life. The line between Christianity and other religions is clearly defined. As he who can say, "There is no God but Allah, and Mohammed is his prophet," is a Mohammedan, so he who regards Jesus as presenting the highest religious ideals of the world, and who tries to follow those ideals in his own life, is a Christian, whatever else he may or may not believe. Men have divided, however, upon a definition of Christianity from the point of view of its historical content. Four great groups of answers have been made to the question, What is the content of Christianity? 1. The teaching of Jesus only. Even the rest of the New Testament is not authoritative and may be in error in fundamental things. For example, the view of John or of Paul regarding the person of Jesus may be rejected. An example of this general position may be found in Harnack's *What is Christianity?* (Eng. trans.). 2. The teaching of the New Testament. Whatever a reasonable exegesis shows this book to teach becomes authoritative Christian doctrine. This does not mean that all beliefs held by any New Testament writer are necessarily true, but that what the New Testament as a whole combines to teach as fundamental truth is necessary for Christianity. This has been, in the main, the position of the Protestant churches and is expressed in the great Protestant creeds. 3. The New Testament and the decisions of the ecumenical councils of

the early Church. So long as the Church remained essentially undivided, its decisions were so guided by the Spirit of God as to make the decrees of its councils authoritative doctrine. Christianity, e.g., includes the interpretation of the person of Christ expressed in the Nicene Creed. This was the position of the Oxford High Church movement in the Church of England in the middle of the nineteenth century. 4. The New Testament and the formal dogmas of the orthodox church up to the present time. This makes the authoritative doctrines of Christianity a constantly growing body, whose essence, however, may be found in the germinal teaching of Christ. No church claims that this may be superseded or changed, but only interpreted in the growing light of truth, by a church guided by the Spirit of God. This is the position of the Roman Catholic church.

All these interpretations, however, would assign to Jesus a unique position in the religion. (For His Life, see JESUS CHRIST.) His relation to Christianity is different from that of any other religious leader to his system. He is more than a teacher like Buddha, or a prophet like Mohammed, or a lawgiver like Moses. In a sense, He is the religion. He lived its ideals. Orthodox Christianity has regarded the reconciliation between God and man as not only revealed, but actually made, by His life and death. His teaching was not independent of history. The germs of it were in the Hebrew prophets. In fact, He was the last and greatest of the prophets, and in Him the prophetic teaching finds its culmination. In the prophets individual religion was mingled with national religion. In the teaching of Christ the national element completely falls away, and the individual religion stands out as the only type of religion. Christ did not inveigh against the national ideals or the temple worship. He only put forth clearly His conception of religion as a relation of personal trust in the fatherhood of God, and shortly national ideas and ritual worship fell away from His followers of their own accord.

The elements common to Christianity and other religions are the sense of human need of superhuman help; the belief in the possible communion between man and God; the conception of the willingness of God to aid man; and a means of bringing about that communion and so of opening for man the possibility of divine help. Its unique element lies in its conception of the means by which man may come into communion with God. Man comes into that communion through Christ, but the interpretation of this phrase differs in different branches of Christianity. Some hold that the communion must be mediated by the church; some, that it is a matter for the individual alone; but all hold that Christ is, in one way or another, the door of communion with God.

Christianity teaches (1) man's ideal life. This ideal is a life in harmony with God. The conception of God, then, is crucial for Christianity. Christ's common term for Him shows His character. God is the Father in heaven. He is holy, but His holiness does not shut Him away from man. His love is the main characteristic of God which Christianity expresses. He is omnipotent and omniscient, but it is not only as abstract wisdom or power that Christianity presents Him. Rather it dwells upon His all-embracing loving-kindness. Man ought to be in loving accord with the loving Father. As Augustine expressed it, "O God, my heart is restless, and finds no rest until it rests in Thee." (2) Man's actual life. This is very far from rest in God. Man is a prodigal son, wandering far from the loving Father's home. He is a sinner, and Christianity calls him to turn and repent. Here lies what has sometimes been termed the pessimism of Christianity. Christianity does not view the world as inherently miserable, as some Oriental religions do, and recommend self-effacement as the remedy. The world is miserable because of its sin. The world is a lost world. Christianity does not reject evolution (q.v.), whereby the race is viewed as progressing upon the whole, and even the Church as developing in grace and knowledge, but it nevertheless regards man as sinful. The result is that the world is a kingdom of evil. Man was made to know God. Remove this knowledge from him by sin, and he tends to evil. But with this view of man and the world is combined another. The apparent pessimism is changed to an optimism. (3) How man may obtain his ideal life. Man is capable of salvation and has in the divine design great and noble possibilities. Christianity comes to bring into his history the saving power which shall rescue him from himself and make him a son of God. It presents to him in Jesus Christ an ideal of purity which, under the ministration of the divine Spirit, convinces him of his sin. The same Spirit produces a new allegiance in his soul, allegiance to God in Christ, creates a new purpose to do the right, animates him by a new affection, that of an all-embracing love, and produces a new obedience to the will of God. The change in him is not a mere change of purpose. It is accompanied with the gift of the Spirit as an abiding, renovating, inspiring, and enabling presence, so that the man finds a new power in himself to overcome the temptations of the world. Christianity puts him, also, in a new society, and it thus saves him. It brings him out from under the condemnation of the law of God, it puts him in the position of communion with his Father, and thus it both shows what he was intended to be and helps him increasingly to attain that ideal. He knows and trusts his Father, and so not only attains the ideal life, but finds with it perfect peace and rest. His mind responds to Christ's sayings, "Ye shall find rest unto your souls"; "Peace I leave with you."

This ideal is not one of selfish inactivity. Harmony with God implies being animated with the same spirit of love which gives God the title "Father." Such a spirit must necessarily issue in loving sympathy with all men, in the attempt to bring them, by every means in the power of man, into that same realization of the love of God which the Christian has found. Here lies the Christian warrant, and even demand, for works of charity and beneficence; for civic and social reform and for mission work. Such good works are a part of the effort to bring all men to that condition of harmony with God which Christ called the Kingdom of God. Christianity is essentially a missionary religion.

In the classifications of religion Christianity is a universal religion, because it is not limited to any race or stage of culture and may be followed as well in one place as another. It thus differs from national and local religions.

It is the absolute religion among the religions which affirm the independent individuality of man; i.e., it holds up as the ideal complete harmony of will between God and man. All religions seek harmony of some sort, but harmony of will is absolute harmony and represents the final stage, beyond which it is impossible to go without becoming pantheistic and accepting the absorption of personality in a monistic being.

Historic Christianity presents other elements than those given in the teaching of Jesus. He made no effort to separate His followers from the Jewish church. The new religion soon began to make converts among the Gentiles, and the question arose whether those who refused to become Jews could be followers of Jesus, whom His disciples regarded as the Jewish Messiah. The real point at issue was whether Christianity was a Jewish Messianic sect or an independent religion. Paul became the champion of the broader view, and his influence, together with the logic of events, soon launched Christianity upon an independent career. It took over, however, many Judaistic elements. Its idea of God, its first Bible, its emphasis on morality, its conceptions of the future life, were parts of its Jewish heritage. It also borrowed from Greek philosophy and institutions. The development of the Church was influenced by the forms of Greek societies, and its theology by Greek thought, especially by Neoplatonism. Later, national ideas and customs molded the different forms of the religion, so that we find sections of it differing as widely as the intellectual Calvinism of Scotland and the semipagan Christianity of Abyssinia.

Some external organization is, of course, necessary for the growth of any religion. Accordingly there has always been a church. The sacerdotal tendency, transplanted from Judaism into early Christianity, strengthened by Augustine (q.v.) and culminating in the papacy, identified the visible with the invisible Church, made membership in it essential to salvation, and viewed the hierarchy as essential to the being of the Church. This view is largely held in the Anglican communion at the present time. Other Protestant bodies have, however, laid the emphasis upon the invisible Church to such a degree that they have acknowledged the validity of any church organization which seemed to possess the Spirit of Christ.

For specific doctrine, see TRINITY; CHRISTOLOGY; ATONEMENT; HOLY GHOST; SACRAMENT; INSPIRATION; RESURRECTION; JUDGMENT, FINAL; ESCHATOLOGY; GREEK CHURCH; ROMAN CATHOLIC CHURCH; LUTHERANISM; CALVINISM.

The evidences of Christianity vary from age to age according to the needs of that age; they must, however, always consist in the display of the essential meaning of Christianity and its place in the plan of the world. The chief external arguments were formerly derived from the fulfillment of prophecy and from the testimony of miracles. The modern stress upon law in the world has caused a change at this point. Prophecy and miracle themselves have now become an object of attack and need defense. The argument for the truth of Christianity as a whole is derived from two principal sources: from history, particularly from Christianity's place in history as a force cooperating with other forces to make history what it is, and that upon its best side; and from the reasonableness of its doctrines and their agreement with the results of every other realm of human knowledge. The internal evidences of Christianity were formerly occupied largely with the character of Christ and the career of the Apostles as both exhibiting the presence of a supernatural power. While these arguments have not passed away and never can, there has been a tendency of late to lay a new stress upon Christian experience as a source of evidence. Not only does the gospel, when accepted and tried, do for the sinner what it professes itself able to do, and thus prove itself because "it works," but the Christian comes to possess an experiential and thus an independent knowledge of the chief truths of Christianity which is logically independent of the Scriptures and the Church, and is thus able to confirm their claims. Consult Stearns, *Evidence of Christian Experience* (New York, 1891).

Bibliography. Chateaubriand, *Le génie du christianisme* (5 vols., Paris, 1802); Paley, *Evidences of Christianity* (ed. by Birks, New York, 1848); Schleiermacher, *Der christliche Glaube nach den Grundsätzen der evangelischen Kirche im Zusammenhange dargestellt* (new ed., Halle, 1897); Renan, *Histoire des origines du christianisme* (Paris, 1862–83); Fisher, *Supernatural Origin of Christianity* (New York, 1875); Bender, *Das Wesen der Religion* (4th ed., Bonn, 1888); Dreyer, *Undogmatisches Christentum* (4th ed., Brunswick, 1890); Lipsius, *Die Hauptpunkte der christlichen Glaubenslehre* (Brunswick, 1891); Hatch, *The Influence of Greek Ideas and Usages upon the Christian Church* (5th ed., London, 1895); Harnack, *What is Christianity?* (Eng. trans., ib., 1901); id., *Expansion of Christianity in the First Three Centuries* (trans., 2 vols., New York, 1904–05); Brown, *The Essence of Christianity* (ib., 1902); Foster, *Finality of the Christian Religion* (Chicago, 1906).

CHRISTIAN KNOWLEDGE, SOCIETY FOR PROMOTING. The oldest religious association connected with the Church of England. Founded in 1698, it did not receive its present name till 1701. It had for object: "(1) To promote and encourage the erecting of charity schools in all parts of England and Wales; (2) to disperse, both at home and abroad, Bibles and tracts of religion; and, in general, to advance the honor of God, and the good of mankind, by promoting Christian knowledge, both at home and in other parts of the world, by the best methods that should offer." It has directed its efforts chiefly to the British dominions, partaking of the nature of an educational association, a missionary society, a Bible society, and a religious tract society; and notwithstanding the operations of other great societies in these several departments of Christian benevolence, it still does a great work. Consult Sewell, *The Society for Promoting Christian Knowledge* (London, 1885), and *An Important Chapter in English Church History* (London, 1905).

CHRISTIAN REFORMED CHURCH. A religious denomination in the United States, numbering, in 1913, 35,142 communicants. It had 209 congregations located chiefly in Michigan, Illinois, and Iowa. The ministers numbered 156, and the Sunday-school scholars about 25,000. The highest church court is the Synod, which meets biennially. This church is the result of secession movements from the Reformed

(Dutch) church (q.v.) in 1822, 1857, and 1882. The doctrinal standards are the same as those of other Reformed churches of Holland origin, viz., the Heidelberg Catechism, Belgic Confession, and Canons of Dordrecht. The Calvin College Theological Seminary, at Grand Rapids, Mich., had, in 1912, 24 students. Most of the churches use the Holland language in divine services; half a dozen are German-speaking; a constantly increasing proportion uses English. The English organ of the denomination is the *Banner of Truth*, published at Holland, Mich. Consult *Religious Census of the United States* (1910).

CHRISTIANS. The religious denomination known as the "Christians" or the "Christian Church" originated near the close of the eighteenth century in three unconnected movements. James O'Kelley and others in Virginia and North Carolina withdrew from the Methodist Episcopal church in 1793 and at first were known as "Republican Methodists." In 1794 they decided to be known only as "The Christian Church," but commonly spoke of themselves simply as Christians. Abner Jones, a Baptist, led a movement in 1800 under which a church was formed in Lyndon, Vt., in which the conditions of membership were simply a belief in Christ and the Holy Scriptures, and the only name for the members was Christian. In 1804, in Kentucky, Barton W. Stone and five other ministers of the Presbyterian church, forming what was known as the "Springfield Presbytery," voted to dissolve that body and henceforth were known to each other as Christian ministers only. At first neither of these groups had any knowledge of the others. But as churches multiplied, they became acquainted, and as early as 1819 general meetings were held. From these developed general organizations for the promotion of publishing, educational, and missionary interests. These are now represented by the American Christian Convention, an incorporated body, composed of representatives of local conferences in the United States and Canada, and of presidents of colleges and State and district organizations coöperating with the convention. It meets every four years. The Mission Board is an incorporated department of the convention, through which mission and church extension work are carried on in the United States, Canada, Japan, and Porto Rico. There were in Japan, in 1913, 9 missionaries, 15 native helpers, 4 mission stations with 15 outposts, 11 churches with 847 members and 2110 Sunday-school scholars. In Porto Rico there were, in 1913, 2 missionaries and 4 churches, with 14 stations and out-stations. In the United States and Canada 32 home-mission pastors and home missionaries were wholly or partly sustained. The educational interests of the convention include the following institutions: The Christian Biblical Institute, Defiance, Ohio; Starkey Seminary, Lakemont, N. Y.; Union Christian College, Merom, Ind.; Elon College, Elon College, N. C.; Weaubleau Christian College, Weaubleau, Mo.; Palmer College, Albany, Mo.; Defiance College, Defiance, Ohio; Jireh College, Jireh, Wyo.; and Franklinton Christian College (colored), Franklinton, N. C. The publishing department is under the control of the Christian Publishing Association. It issues the *Herald of Gospel Liberty*, a weekly religious newspaper, which was established by the Rev. Elias Smith at Portsmouth, N. H., Sept. 8, 1808. Other publications of the Christians are the *Christian Missionary*, *Christian Sun*, *Christian Vanguard*, besides local and conference publications. The Christians had, in 1913, about 110,000 communicants and 1318 ministers. There are 72 conferences, some of which are combined into State or district organizations, such as the New England Christian Convention and the Southern Christian Convention. The latter body was organized in 1856, when the Southern delegates to the American Christian Convention at Cincinnati, Ohio, withdrew on account of resolutions passed by that body condemning slavery. They were practically reunited in 1890. The pioneers of the Christians had little thought of organizing a new sect. In order to maintain public worship and properly care for the membership, they were compelled to organize more perfectly, but they strove to preserve the principles upon which the movement was based. These are: Christ the only head of the Church, excluding popes, bishops, and similar ecclesiastics; acceptance of the Bible as a sufficient rule of faith; avoidance of sectarian or divisible names; Christian character as the only requirement for fellowship or church membership; insistence upon the right of private judgment and liberty of conscience in all matters of theological opinion and ceremonial observance, and advocacy of the union of all the followers of Christ.

CHRISTIANS, or DISCIPLES OF SAINT JOHN, or MANDÆANS, or SABIANS (Lat. *Johannitæ*, from *Johannes*, John). A small religious body in south Babylonia. The name "Christians of St. John" is not used by them and is a misnomer. Their veneration of John the Baptist and the similarity of certain of their rites with those of the Christians led the early Carmelite missionaries to believe them to be the descendants of the early disciples of John. One of these missionaries, Ignatius a Jesu, who came in contact with them in Basra, introduced this name to Europe in a description of them (1652). In fact, the religion is Gnostic in origin, with some infusion of Persian and Indian philosophy. See MANDÆANS.

CHRISTIANSAND, krĭs'tyăn-sănd'. An episcopal city, the largest in south Norway, situated at the mouth of the Torrisdals Elv, in the Bay of Christiansand (Map: Norway, C 7). The town exports lumber, fish, lobsters, hides, copper, and iron. Its harbor is good. It has twice, once in 1880 and once in 1892, been devastated by fires. Its fortifications have become useless because of the fortress built at Flekkerö, 5 miles distant. Pop., 1891, 12,813; 1901, 14,566; 1911, 15,154. It was founded by Christian IV in 1641.

CHRISTIANSBURG, krĭs'chanz-bûrg. A town and the county seat of Montgomery Co., Va., 33 miles southwest of Roanoke, on the Norfolk and Western Railroad (Map: Virginia, D 4). It is known as a summer resort and contains the buildings of the Old Montgomery Female College. Stock raising is the chief industry. Pop., 1910, 1568.

CHRISTIAN SCIENCE. The name given by Mary Baker Eddy to the discovery which she made in 1866 and the religion which she afterward founded. As its name indicates, Christian Science is an interpretation of the religion taught and practised by Christ Jesus. It purports to be the science of God and His universe, including man,

and the science of salvation from all evil.

Christian Science defines God as "incorporeal, divine, supreme, infinite Mind, Spirit, Soul, Principle, Life, Truth, Love" (*Science and Health*, by Mrs. Eddy, page 465). It affirms the divine individuality or infinite personality of God, but denies that He is personal in a human or finite sense, and rejects all anthropomorphic conceptions of Deity. Christian Scientists vindicate the use of unusual synonyms for God by saying that they are intended, and are all required, "to express the nature, essence, and wholeness of Deity" (*Science and Health*, page 465). Christian Science declares that God is the divine Principle of all real being; that is, the cause, origin, source, and substance of all that has actual existence. It also declares that the will of God is the law of divine Love which invariably provides, and is always available, for the welfare and preservation of man. With reference to the relation between God and man as "the creator and the created," and the nature of real personality, Mrs. Eddy has said, "We are not transcendentalists to the extent of extinguishing anything that is real, good, or true; for God and man in divine Science, or the logic of Truth, are coexistent and eternal, and the nature of God must be seen in man, who is His eternal image and likeness. . . . Scholastic theology makes God manlike; Christian Science makes man Godlike." (*Message to The Mother Church* for 1901, pages 5 and 7.)

Christian Science denies the personality of evil, the devil, or Satan, and avers that evil has no real entity or existence. It does not deny that sin, disease, death, want, woe, suffering, and all the phenomena of evil have a relative existence in human experience; but this science does deny that evil, in any form, has the reality of absolute substance or being; it affirms that every phase of evil can be scientifically abated and abolished, and it gives to its students a spiritual understanding that lifts them more and more into the realm of the real.

Why does Christian Science attach so much importance to its healing? Christian Scientists reply that mankind is in great need of relief from disease, and this science is the most effectual means to that end; also, that Christian healing results from the power of good over evil, and is certain to turn thought towards God to-day or to-morrow, even as it did before: "When the multitudes saw it, they marvelled and glorified God, which had given such power unto men" (Matt. ix. 8).

In denying that Jesus is God, Christian Science relies chiefly on the authority of his own utterances, and maintains that this view alone gives full effect to all his sayings. While acknowledging the atoning sacrifice of Jesus, Christian Science finds the essential efficacy of his atonement in his life—in his teaching and demonstration of the truth of being; as he himself said, "Because I live, ye shall live also" (John xiv. 19). Christian Science holds that Jesus acted within the range of what is possible for men, exemplifying universal possibilities, even as he said, "He that believeth on me, the works that I do shall he do also" (John xiv. 12); also, that Jesus was rightly entitled to the name Messiah or Christ, though either of these terms is less a personal name than a designation of his office; that the office of the Christ is to liberate and deliver, to heal and to save; and that, to quote the words used by Mrs. Eddy on page 473 of *Science and Health*, "Christ is the ideal Truth, that comes to heal sickness and sin through Christian Science, and attributes all power to God . . . Jesus is the human man, and Christ is the divine idea; hence the duality of Jesus the Christ."

Christian Scientists, therefore, invite all men to reëxamine the Scriptures in the light thrown upon them by this teaching, to the end that all may begin anew the working out of the salvation which Jesus taught and exemplified. In support of this appeal, they point to the complete change of theory which ecclesiastical Christianity has more than once undergone regarding the way of Christian salvation, to the evident correspondence of Christian Science to all the teachings of Jesus, and to the increased benefits of Christianity which have come to pass since the advent of its science. This science, so they aver, has come to repeat what Jesus knew and taught; to be that "spirit of Truth" which he foretold and promised (John xiv. 15–26; xv. 20–26; xvi. 7–15); to revive his original gospel, without the limitations which have arisen in human belief; to restore the scope and complete the mission of primitive Christianity. In short, the aim of Christian Science is to introduce the practice of original Christianity, with its knowledge of the truth that makes free and its consequent power over error and erroneous conditions.

As an organization, the Christian Science church is remarkable for its simplicity. It consists of "The Mother Church," at Boston, "branch churches" to be found wherever there are a sufficient number of Christian Scientists, and "societies" where the number of Scientists is not yet large enough for a church. The affairs of The Mother Church are conducted by a board of directors in accordance with a definite order established by Mrs. Eddy and published in the *Church Manual*. The branch churches and societies are self-governing, subject only to certain provisions of the *Church Manual*. The functions of The Mother Church, outside its character as a local church with seats for 5000 people, are those related to the denomination as a whole. Included in these activities are the publication of a directory of representative practitioners, the certifying of authorized teachers, the maintenance of a board of lectureship, the issuance of authentic literature, and the employment of other means for guarding the purity and integrity of Christian Science.

As a religious movement, Christian Science is notable for the rapidity of its growth and the intelligent class of people which it has attracted. The First Church of Christ, Scientist, was organized in 1879 at Boston. In 1915 there are 1500 Christian Science churches and societies. A majority of these are in the United States, but they are numerous wherever the English language is spoken, and a considerable number are to be found in other countries. It was predicted that the passing of Mrs. Eddy (in 1910) would mark the highest point for the Christian Science movement, but its growth and vitality steadily increased after that event as before.

Consult: Eddy, *Science and Health with Key to the Scriptures* (Boston, 1906); id., *Miscella-*

neous Writings (ib., 1896); id., *The First Church of Christ, Scientist, and Miscellany* (ib., 1913); Wilbur, *The Life of Mary Baker Eddy* (ib., 1913). See also bibliography under EDDY, MARY BAKER.

CHRISTIANSEN, krĭs'tē-ăn-sen, ARNE EINAR (1861–). A Danish dramatist, unconventional, but noteworthy for his mastery of the playwright's art. His first play, *Lindows Børn* ('Lindow's Bairns,' 1881), was a prose comedy. It was followed by another, *En Egoist* (1882). He then passed several years in travel in various European countries and the Orient. On his return he turned to tragedy in *Nero* (1885) and afterward wrote, besides comedies and prose dramas, several romantic historical plays in verse; a philosophic drama in verse (*Cosmus*, 1897), remarkable for its skillful blending of romanticism and idealism; novels (*Joppe*, 1889; *Hjarl*, 1894); and the libretti of several original operas. In 1899 he was made director of the Royal Theatre in Copenhagen. Christiansen is at his best when he depicts the life of the higher Copenhagen bourgeoisie.

CHRISTIANSEN, CHRISTIAN (1843–). A Danish physicist, born in Loenborg. He studied in Copenhagen, subsequently taught at the school of technology there, and in 1886 became professor of physics in the university. He carried out several interesting investigations on subjects of natural philosophy, and wrote general scientific works in Danish, including an introduction to mathematical physics (1887–89). Among his original contributions to physics, his researches on radiant heat deserve mention.

CHRISTIANSFELD, krĭs'tĭ-ăns-fĕlt' (Ger., Christian's field). A settlement of Moravian Brethren, in the northern part of Schleswig, about 2 miles from the Danish frontier, founded in 1773. The houses, which are well built and cheerful in appearance, are arranged in two parallel streets, with the church upon a green plot in the middle. There is a coöperative farm, and there are manufactures of soap, candles, leather, tobacco, and wool. Pop., less than 1000.

CHRISTIAN SOCIAL UNION. An organization founded in England in 1889, by members of the Church of England, for the study and advocacy of Christian socialism and the application of the principles of Christianity to social problems. The first body was organized at Oxford, and a branch was founded in London in 1891. The Oxford branch has given its chief attention to the study of economic facts, while the London branch is active in holding meetings, issuing addresses, and in general carrying on active propaganda. There are branches in other important cities of England, and in Australia and New Zealand. It has two organs in England, *The Economic Review* and *The Commonwealth*. An affiliated organization of the same name and with the same general purpose was founded in the United States in 1891. Its first president was Bishop F. D. Huntington.

CHRISTIANS OF SAINT THOMAS. The name of a branch of the Christian Church still existing on the Malabar coast, southwestern India, hence called by themselves the Syrian Church of Malagala, formed originally by excommunicated Nestorians, although it claims the Apostle Thomas as its founder. In the eighth century it received a metropolitan from the Nestorian patriarch. The liturgy is in the Syriac language. They still celebrate the early agape, or love feast, use bread, salt, and oil in the communion service, and anoint infants on baptism. Their priests are allowed to marry. Consult: Hugh, *History of Christianity in India* (4 vols., London, 1839–45); the monograph by W. Germann, *Die Kirche des Thomaschristen* (Gütersloh, 1877); Richter, *A History of Missions in India* (New York, 1908).

CHRISTIANSTAD, krĭs'tē-ăn-städ', or **KRISTIANSTAD** (Swed., Christian's city). A town in south Sweden, capital of a län of the same name, situated on the Helge, about 14 miles from Ahus on the Baltic, and 265 miles southwest of Stockholm (Map: Sweden, E 8). It is regularly built, possesses an arsenal and a magnificent church of the seventeenth century, a museum, and is the seat of a court of justice. Its fortifications were destroyed in 1847. The chief manufactures are woolen stuffs, tobacco, leather, ironware, and gloves, while the trade in brandy and grain is considerable since the river has been made navigable to this point. Pop., 1901, 10,318; 1912, 11,680. The town, which was founded by Christian IV of Denmark in 1612, came into the hands of Sweden in 1658 and suffered many sieges during the wars between Denmark and Sweden.

CHRISTIANSTED, krĭs'tē-ăn-stĕd' (Dan., Christian's city). The capital of the Danish West Indies and the chief town of the island of Santa Cruz. It is situated on the northeast coast of the island and has an excellent harbor which is defended by a fort and a battery. The chief exports are sugar, molasses, and rum. The population numbers about 6000.

CHRISTIANSUND, krĭs'tē-ăn-sŏŏn' (Norweg., Christian's sound). A seaport on the west coast of Norway, 85 miles west-southwest of Trondhjem, situated on three small islands (Map: Norway, C 5). It is a very flourishing town, having an excellent harbor formed around the islands. But fresh water is scarce and must be brought to the islands in long aqueducts. It exports great quantities of fish. It has also a thriving coast trade, which is carried on in its own ships. Pop., 1891, 10,381; 1901, 12,043; 1911, 13,012. The town was called Christiansund in 1742 in honor of Christian VI, who gave it its privileges.

CHRISTIAN UNION, INDEPENDENT CHURCHES OF CHRIST IN. The Christian Union churches were formed in Ohio during the first years of the Civil War, when enthusiasm for the war in defense of the national Union against secession was strong in the Northern churches, and the duty of supporting the government was freely preached by their ministers. Under the leading, principally, of the Rev. J. Flack, previously of the Methodist Episcopal church, church members who were opposed to the war and those who disapproved of what was called political preaching were gathered into separate congregations. After the period of the war and reconstruction the aim of these churches gradually became to promote Christian unity and undenominationalism. At the General Council of 1878 a paper defining the position of the organization was adopted which was essentially the same in terms with the declaration of the Christian Connection, and the Christian Union churches became affiliated with that body in 1890. At that time they had, according to the census of 1890, 294 congregations, with 18,214 communicant members, in 17 States.

CHRISTIAN UNITY, WORLD CONFERENCE ON. A movement which originated at the general

convention of the Protestant Episcopal church in the United States in 1910, when the following resolution was adopted: "Whereas there is today among all Christian people a growing desire for the fulfillment of Our Lord's Prayer, that all His disciples may be one, that the world may believe that God has sent Him; *Resolved:* That a joint commission be appointed to bring about a conference for the consideration of questions touching faith and order, and that all Christian communions throughout the world which confess our Lord Jesus Christ as God and Saviour be asked to unite with us in arranging for and conducting such a conference. The commission shall consist of seven bishops appointed by the chairman of the House of Bishops, and seven presbyters and seven laymen appointed by the president of the House of Deputies." This commission was accordingly appointed, with Bishop Anderson of Chicago as president. Steps were immediately taken to secure the coöperation of Christians in the United States. The leading Protestant communions promptly responded, and the majority of them appointed similar commissions or committees. Conferences with a view to obtaining coöperation were held with officials of the Roman Catholic church, the Eastern Orthodox church, the Holy Orthodox church of Russia, and the Church of Armenia. The greatest interest and sympathy in the movement was shown by these officials. Up to Oct. 15, 1913, 30 commissions or committees had been appointed by denominations throughout the world. These included, in addition to the Protestant denominations in the United States, the Church of England, the Holy Catholic church of Japan, and the Old Catholic churches in Europe. On May 8, 1913, an informal conference was held in New York City, in which representatives of all commissions appointed in the United States were invited to take part. Preliminary arrangements were considered for the holding of a world conference on some future date.

CHRISTIAN YEAR, The. A religious work by John Keble (1827), containing reflections in verse appropriate for Sundays and holy days throughout the year. It is marked by deep religious sentiment, love of nature, and domestic affection.

CHRISTIE, krĭs'tĭ, Anne (1837–). A Canadian poet and novelist. She was born in London, England, but early went to Canada to live on Amherst Island, near Kingston, Ontario. Afterward she removed to North Gower and later to Ottawa. She contributed many short stories and poems to British, Canadian, and American magazines. Some of her poems appeared in *The Magazine of Poetry*, and those written on various phases of the half-breed rebellion in the Northwest received high praise from Sir Edwin Arnold. She also wrote four novels: *Alice Gray* (1873); *Edged Tools* (1880); *Requited* (1886); *Loved I not Honour More* (1887); and a poem, *A Canadian's Appeal to Canada* (1911).

CHRISTIE, krĭs'tĭ, Richard Copley (1830–1901). An English scholar and bibliophile, born at Lenton, Nottinghamshire. He matriculated in 1849 at Lincoln College, Oxford (where began his friendship with Mark Pattison), and afterward studied for the bar. In 1854 he received the appointment of professor of history at Owens College, Manchester, recently founded, and later he was given the chairs of political economy and commercial science and jurisprudence and law. The last of these appointments he resigned in 1869, but his connection with the college, as one of its governors and most interested advisers, lasted until his death. From 1872 to 1893 he was chancellor of the diocese of Manchester. Christie left to Owens College his rare library, containing one of the largest private collections of editions of Horace (800 vols.), as well as his collection of Renaissance literature. As an author his most important book is *Etienne Dolet, the Martyr of the Renaissance* (1880; rev. ed., 1899), which was translated into French by C. Stryienski (1886) and is worthy to be classed with his friend Pattison's *Casaubon*. Among other works by him are valuable studies of certain Renaissance characters. His bibliographical writings include: *The Marquis de Morante: His Library and its Catalogue* (1883); *Catalogues of the Library of the Duc de la Vallière* (1885); *Elzevir Bibliography* (1889); *Chronology of the Early Aldines* (1895). The most notable of his works are collected in the *Selected Essays and Papers of Richard Copley Christie*, ed., with a memoir, by W. A. Shaw (1902).

CHRISTIE, Robert (1788–1856). A Canadian journalist, legislator, and historian. He was born in Nova Scotia, but in early manhood removed to the city of Quebec, studied law, and was called to the bar. He showed little interest in his profession and never succeeded in it; but his keen interest in the issues which precipitated the union of Upper and Lower Canada in 1841 led him into journalism and politics. He took the popular side; but his views were often visionary and unpractical, while his restive temper made him difficult to coöperate with. For some time he was an editorial contributor to the Quebec *Gazette* and the Quebec *Mercury*, and his writing, informed by ample political knowledge, exerted a strong influence. He was elected to the Legislative Assembly of Lower Canada, but in 1829 he was expelled for having wrongfully advised the dismissal of a number of justices of the peace. He was reëlected, and expelled a second time. In 1841–56 he was a member of the Canadian Legislative Assembly. He wrote a *History of the Late Province of Lower Canada* (6 vols., 1866), a work containing a valuable mass of historical material, but ill arranged and marred by serious defects of style.

CHRISTIE, Sir William Henry Mahoney (1845–). An English astronomer, born at Woolwich. He received his education at King's College School, London, and at Trinity College, Cambridge. He was elected a fellow of his college in 1869; in 1870 he was made chief assistant at the Royal Observatory of Greenwich and in 1880 secretary of the Royal Astronomical Society. In 1881 he succeeded Airy as Astronomer Royal and held that position until 1910. His published works include a *Manual of Elementary Astronomy* (1875) and a number of valuable technical papers contributed to scientific periodicals.

CHRISTINA, krē-stē'nȧ. Queen of Spain. See María Christina.

CHRISTINA (1626–89). Queen of Sweden from 1632 to 1654. She was the daughter of the great Gustavus Adolphus, and was born Dec. 18, 1626. She became Queen after the death of her father in the battle of Lützen, in 1632. Till 1644 she reigned under a regency headed by the Chancellor Oxenstierna. Distinguished by the possession of a lively imagination, a good memory, uncommon intelligence, and remarkable

aptitude for serious study, she received the education of a man rather than that of a woman, and to this may in part be attributed the many eccentricities of her life. Her subjects and counselors earnestly desired her to marry, but the Queen's restless spirit would accept no such bond. In 1649 she had her cousin, Charles Gustavus (see CHARLES X), declared her successor by the Estates of the realm. Her reign was notable for the patronage of learning and science; but the Queen was too eccentric and cared too little for politics to give that force to the administration which the position of Sweden in Europe at that time, and its own lively internal politics, required. In 1654 Christina voluntarily abdicated in favor of her cousin, reserving to herself sufficient revenues, her entire independence, and supreme authority over her suite and household. She embraced Roman Catholicism and afterward resided chiefly in Rome and in France, gathering about her a court of brilliant and learned men and spending much time in literary and scientific pursuits. She covered herself with infamy by the murder in 1657 at Fontainebleau of her grand equerry and favorite, Monaldeschi. After the death of Charles Gustavus in 1660 Christina repaired to Sweden and began to intrigue for the recovery of her throne; but her subjects cut short her pretensions by forcing her to sign another formal act of abdication. She died April 19, 1689. Consult: Geyer, *Geschichte Schwedens*, vol. iii (Hamburg, 1836); Archenholtz, *Vie de Christine par ellemême* (Stockholm, 1751); Bain, *Christina, Queen of Sweden* (London, 1890).

CHRISTINE DE PISAN, krē'stēn' de pē'zăN' (1363–1431). A French writer, daughter of an Italian astrologer. Left a widow with three children, she made letters a livelihood and wrote some controversial and historical prose and considerable didactic verse, such as *Le chemin de longue estude* and the *Poème de la pucelle*, which are valuable pictures of the state of society. She wrote in defense of women. Caxton translated some of her works and printed Earl Rivers's version of her *Moral Proverbs* (1478). There is an edition of her *Œuvres poétiques* by Roy (1887–92). For her biography, consult Koch (Goslar, 1885).

CHRIS'TISON, SIR ROBERT (1797–1882). A Scottish physician. He was born in Edinburgh, studied medicine there, and afterward went to Paris to study chemistry under Robiquet and toxicology under Orfila. In medical jurisprudence and toxicology he became especially eminent. He was twice president of the Edinburgh College of Physicians, was physician in ordinary to the Queen in Scotland, and was created a baronet on Mr. Gladstone's recommendation in 1871. His best-known works were: *Treatise on Poisons* (1829) and *Granular Degeneration of the Kidneys* (1839). Consult his *Life*, edited by his sons (Edinburgh and London, 1885–86).

CHRISTLIEB, krĭst'lēp, THEODOR (1833–89). A German theologian, born at Birkenfeld, Württemberg. He was educated in Tübingen, taught in France, and preached in London from 1858 to 1865; returned to Germany, and in 1868 was made professor of practical theology and university preacher in Bonn. In 1873 he was a delegate to the Evangelical Alliance in New York. His best-known works, translated into English, are: *Modern Doubt and Christian Belief* (1870; 4th ed., 1879) and *Protestant Foreign Missions: Their Present State* (1880). Among his other works are: *Leben und Lehre des Johannes Scotus Erigena* (1860); *Der Missionsberuf des evangelischen Deutschlands* (1876); *Der indobritische Opiumhandel* (1874); *Ärztliche Missionen* (1884).

CHRISTMAS, krĭs'măs (ME. *Cristmas, Cristesmesse*, Christ's mass). The day on which the nativity of the Saviour is observed. The institution of this festival is attributed by the spurious decretals to Telesphorus, who flourished in the reign of Antoninus Pius (138–161 A.D.); but this is unhistorical. It is unknown just when it originated, but surely December 25 was not generally observed as the day prior to Chrysostom's time (fourth century) in the Eastern church, although much earlier in the Western; for there was no uniformity in the period of observing the Nativity among the early churches; some held the festival in the month of May or April, others in January. January 6 was the usual date for the feast of the Nativity in the Eastern church, and still continues to be the date in the Armenian church. Some modern scholars hold that this was also the date in the early times in Rome, and that December 25 was adopted under Pope Liberius in 353 or 354. The celebration of December 25 spread to most parts of the East in the fourth and fifth centuries. It is impossible to establish any date as the exact time in the year of the birth of Christ. It is often objected that December 25 cannot be the true date, for it is then the rainy season in Palestine, when shepherds would hardly have been watching their flocks by night in the fields. The "spirit of Christmas," however, is of far greater importance than the historical exactness of its time. The reasons for the final choice of December 25 cannot now be determined. Calculations, on somewhat arbitrary grounds, of the time of Christ's birth may have influenced it. The desire to displace the orgies of the Roman saturnalia is now less often ascribed as a reason than formerly. A widespread feast of the Great Mother may have had influence. The wish to place a Christian feast in opposition to the feast of the sun (*sol invictus*) at the winter solstice may have had weight. The early Church was eager to replace pagan festivals by Christian. As Christianity spread, the feast of the winter solstice, the time when the day begins to increase, and light to triumph over darkness, was easily turned into the feast of Christ, the light of life. At the winter solstice the Germans held their great Yule feast, in commemoration of the return of the fiery sun wheel, and believed that during the 12 nights reaching from December 25 to January 6 they could trace the personal movements and interferences on earth of their great deities, Odin, Berchta, etc. Many of the beliefs and usages of the old Germans, and also of the Romans, relating to this matter, passed over from heathenism to Christianity and have partly survived to the present day. But the Church also sought to combat and banish—and in this it was to a large extent successful—the deep-rooted heathen feeling, by adding, for the purification of the heathen customs and feasts which it retained, its grandly devised liturgy, besides dramatic representations of the birth of Christ and the first events of His life. Hence sprang the so-called "manger" songs and a multitude of Christmas carols as well as Christmas dramas, which at certain times and places degenerated into farces or fools' feasts (q.v.). Hence, also, originated at a later period the

Christ trees, or Christmas trees, adorned with lights and gifts, the custom of reciprocal presents and of special Christmas meats and dishes, such as Christmas rolls, cakes, currant loaves, dumplings, etc. Thus Christmas became a universal social festival for young and old, high and low, as no other Christian festival could have become. At one time the festivities were continued until Candlemas and Twelfth Day.

Christmas not only became the parent of many later festivals, such as those of the Virgin, but especially from the fifth to the eighth century gathered round it, as it were, several other festivals, partly old and partly new, so that what may be termed a *Christmas cycle* sprang up, which surpassed all other groups of Christian holidays in the manifold richness of its festal usages, and furthered, more than any other, the completion of the orderly and systematic distribution of Church festivals over the whole year.

In the Roman Catholic church each priest celebrates three masses at Christmas, viz., at midnight, at daybreak, and in the morning. The day is also observed religiously by the Anglican and Lutheran churches. The Scotch Presbyterians and English Nonconformists generally rejected all religious observance of the day as a "human invention" and savoring too much of "papistry." It is said that the Puritan founders of New England established the Thanksgiving festival as in some measure a substitute for Christmas. At the present time the tendency is strong towards religious observance of the day in all Protestant bodies.

CHRISTMAS BOX. See BOXING DAY.

CHRISTMAS CARDS. Pictured souvenirs appropriate to Christmas, which modern fashion has introduced into the social world. The earliest example of this art is attributed to J. C. Horsley, R.A., who in 1846 made designs of this character. Subsequently the demand for these tokens has become enormous, and at present Christmas cards are often of much artistic merit in both design and coloring.

CHRISTMAS CAROL. See CAROL.

CHRISTMAS CAROL, THE. A Christmas story by Charles Dickens, published in 1843. It narrates the regeneration of the miser Scrooge by the kind offices of "Marley's Ghost." The story was published in London by Chapman and Hall, and 15,000 copies, bringing the author over £700, were soon sold.

CHRISTMAS ISLAND. A small island in the Indian Ocean, in lat. 10° 25′ S. and long. 105° 42′ E., and about 190 miles south of the west end of Java. It has not a very good anchorage, but was colonized in 1907 from the Cocos-Keeling Islands, chiefly for the purpose of working valuable beds of phosphate of lime. It is under British control and administratively belongs to the Straits Settlements.

CHRISTMAS ISLAND. A large, low atoll in the Pacific Ocean, in about lat. 2° N. and long. 157° 30′ W. It has a good anchorage and belongs to the British government. It was discovered by Cook in December, 1777.

CHRISTMAS PANTOMIMES. Harlequinades given at Drury Lane and Covent Garden theatres at Christmas time. The institution dates from the end of the seventeenth century and reached its highest point under Garrick. The performance usually opens with the representation of some fairy tale, the characters of which change to the harlequin, columbine, and clown of the pantomime which follows.

CHRISTMAS ROSE. See HELLEBORE.

CHRISTODORUS OF COPTUS (Gk. *Χριστόδωρος Κοπτεύς, Christodōros Koptεus*). A Greek poet resident in Egypt, at the close of the fifth and the beginning of the sixth century A.D. His three books of epigrams have perished, except two epigrams preserved in the *Palatine Anthology*. (See ANTHOLOGY.) He is best known for his description in 416 hexameter verses of 80 statues contained in the gymnasium of Zeuxippus in Constantinople. This poem, which forms book ii of the *Palatine Anthology*, has, in the opinion of some critics, considerable value for both literature and the history of art.

CHRISTOLOGY (from Gk. *Χριστός, Christos*, Christ + *λογία, logia*, account, from *λέγειν, legein*, to say). A technical term in theology, signifying the doctrine of the person of Christ, or the answer to the question, What is the relation of the divine and human in Christ? The elements of the problem may be said to have been given by the original and unvarying conviction of the Church. That Christ was man was too plain to be denied by any. But no less plain did it seem from the beginning, to the Apostles (John i. 14) and to the humble men who bore the first testimony to Christ by the surrender of their lives (Ignatius, *Eph.* vii, etc.), that He was truly divine. On the subtleties of this problem they did not dwell; but it certainly never occurred to them to divide His personality. And so, when more careful reflection was forced upon the Church, the question was one of adjustment of accepted truths. How could divinity and humanity coexist in the unity of one person?

There were early answers to the question which were tentative and soon rejected as incorrect. The Gnostics (q.v.) generally made the humanity a mere appearance; but their whole system was recognized as anti-Christian.

The great classical period of the growth of Christology was from the second century to the Council of Chalcedon. The first answer to the problem of the person of Christ was Modalist, Patripassian, or Sabellian. (See SABELLIUS.) Christ is divine, and His divinity is indistinguishable from God the Father. He is a mode or manifestation of the divine Father. This theory affirmed Christ's divinity and denied His humanity. The discussion closed with Origen, who affirmed the real divinity and humanity, both in one person. Then followed the Arian controversy, which for a time split the Church. Arius held that Christ was divine, of a "like substance" (*homoiousios*) with the Father. He is the first of created beings, and in Him the divine Logos takes the place of a rational soul. Athanasius held that Christ is of the same substance (*homoousios*) with the Father, uncreated, from eternity, yet the Son of God. This became in the end the orthodox belief regarding the divine side of Christ's nature and is expressed in the Nicene creed. Thought about the human side produced another group of controversies. If Christ is of the same substance with the Father, how is His human nature related to the divine? Apollinaris held that Christ had no proper human nature, the divine Logos taking its place. Eutyches held that after the incarnation there was but one nature, the human being absorbed in the divine. Nestorius held firmly to the two natures, but dissolved the personality, making Christ a twofold person, the natures subsisting in "conjunction." The Nestorian position resulted in a schism, the Nestorian church having

a long career in Persia and the East and persisting to the present time.

By the time of the Council of Chalcedon (451) these various efforts at explanation, resulting in the essential modification of some element of the theanthropic person, had all been thought through and all finally condemned. The Church was ready to adopt a creed which reaffirmed all the three elements of the problem in the following words: We confess "one and the same Son, our Lord Jesus Christ, the same perfect in Godhead and also perfect in manhood; truly God and truly man, of a reasonable soul and body; consubstantial with the Father according to the Godhead, and consubstantial with us according to the manhood; in all things like unto us, without sin; begotten before all ages of the Father according to the Godhead; and in these latter days, for us and our salvation, born of the Virgin Mary, the mother of God, according to the manhood; one and the same Christ, Son, Lord, only begotten, to be acknowledged in two natures, inconfusedly, unchangeably, indivisibly, inseparably; the distinction of natures being by no means taken away by the union, but rather the property of each nature being preserved and concurring in one person and one substance, not parted or divided into two persons, but one and the same Son and only begotten, God the Word, the Lord Jesus Christ."

But the creed of Chalcedon was not acceptable to all. The Monophysite ('one nature') church broke off, holding that "two natures" could only mean two persons, not one. The present Coptic, Ethiopic, Armenian, and Jacobite churches are Monophysite, the survivors of this controversy. An attempt was made to bring the two parties together by the statement that Christ, though having two natures, had one will (Monothelite), but this only resulted in further schism, the survival of which is found in the present Maronite church in Syria. With these various objectors excluded, the orthodox church maintained the creed of Chalcedon.

From this period there has been no critical discussion of the fundamentals of Christology within the limits of orthodoxy. In the Greek theology there was a subordination of Christ to the Father, but even that was done away with for the Latin church in the so-called Athanasian creed, where Christ is put on an exact equality with the Father. In the Reformation the Protestant church maintained two natures in one person and jealously affirmed allegiance to the Christology of the historic creeds. The only new phase of the problem was the Socinian solution, which after some shifting finally held that Christ was a mere man. This had no influence on orthodox Protestantism.

During the past century there has been a great deal of interest taken in Germany, in particular, in the Christological problem, and three strenuous and distinct theories of Christ's person have been set forth, all within the bounds of the historic creeds. Professor Dorner of Berlin began, not with the person of Christ, but with the two natures, for, as the person resulted from the union of the natures, it could not be understood till the natures of which it was composed were understood. The humanity of Christ is the full human personality, with full self-consciousness and self-determination. The divine nature is unchangeably the same, possessing all its divine attributes, omnipotent and omniscient. But the humanity is neither of these; and hence the divinity cannot impart itself completely to the humanity. The incarnation is viewed as the gradual impartation of the Logos to the man Jesus, increasing with his development and perfect only after the ascension.

The second theory, that of the "kenosis," begins at the one person of Christ, which the kenotics make to be the eternal Logos of God. This person takes upon himself humanity, so that his consciousness is a truly human consciousness, while it is still the consciousness of the divine element in Christ. This can only be as the divine limits himself to the capacities of the humanity which he assumes. The theory of the kenosis therefore teaches that the eternal Logos, by a conscious divine act of self-limitation, "emptied" himself of his divine form of existence and took upon himself the human form of existence (Phil. ii. 7). Thus, while he was in essence unchanged, he had laid aside the divine attributes of omnipotence, omniscience, etc. This theory has had a considerable following among men of conservative and churchly tendencies.

A third theory is that of Ritschl. Weary of all the long ontological disputes of the centuries, Ritschl sought to render them all unnecessary by a strict limitation of theology to that which is of "interest" to men, i.e., that which furthers the religious life. While he held, therefore, to the divinity of Christ in the true sense, he refused to attempt the explanation of its consistency with His humanity, regarding it as great a mystery as the consistency of the divine government with human freedom. In Christ we have God, for only in Him do we come to know God. Our knowledge of His divinity rests on our recognition of His perfect unity with God. That is enough. What the nature of the Trinity is, does not "interest" us. If we knew all about the preëxistence of Christ, it would rather separate Him from us than render faith in Him easier or more sincere. We must give up definitely the two natures and all attempts to unite them. In the true humanity of Christ we have God. How, we do not know. This view, which falls in with the tendencies of the times to seek simplicity has also found favor, but it scarcely seems to offer substance enough to prove a final resting place for thought.

England and America have contributed little of permanent value to this subject. The Unitarian movement in America represented rather a rejection of the Nicene theology than any positive constructive theory. Sanday, in *Christologies, Ancient and Modern* (New York, 1910), has sought to use the modern theory of the subconscious in the explanation of the divinity of Christ, but the theory is itself still in need of proof. The field is open for a reinterpretation of the person of Christ in the light of the thought of the present, while still retaining the religious values of the ancient creeds.

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1875–81). On the kenosis consult Gess, *Christi Person und Werk* (3 vols., Basel, 1870–87); Thomasius, *Dogmatik* (Erlangen, 1852–61); Frank, *System der christlichen Wahrheit* (Gütersloh, 1885–86); Bruce, *The Humiliation of Christ* (London, 1881); Powell, *Principle of the Incarnation* (London, 1896). On Ritschl, his own *Rechtfertigung und Versohnung*, vol. iii (Bonn, 1888, 1889; Eng. trans., London, 1900); A. J. Swing, *The Theology of Albrecht Ritschl* (New York, 1901); Garvie, *Ritschlian Theology* (London, 1902).

CHRISTOPHE, krēs'tōf', HENRI (1767–1820). A negro king of Haiti. He was born a slave in the island of Grenada, purchased his freedom, and settled in the French portion of Haiti, it would seem, either as a butcher or a plantation overseer. In the insurrection against the French he gained fame as one of the ablest lieutenants of Toussaint L'Ouverture. He held out bravely against General Leclerc for some time in 1802 and, after laying down his arms, took part with Dessalines in the successful rising of 1803. During the short-lived government of Dessalines, who was slain by a military conspiracy in 1806, Christophe was general in chief of the Haitian army. In February, 1807, he was appointed President of Haiti for life. A republic being about the same time organized at Port-au-Prince, with Pétion at its head, a protracted civil war ensued. In 1811 Christophe was proclaimed King of Haiti, by the name of Henry I, and was crowned June 2, 1812. By his power and skill Christophe was enabled to counteract the attempts made by France to regain its authority in the island. His avarice and cruelty led to an insurrection, which was aided by General Boyer, who had succeeded Pétion in 1818. The rebellion spread to the capital, and Christophe's deposition was proclaimed at the head of the troops. Deserted by his bodyguard and his nobles, he shot himself Oct. 8, 1820. He left a code of laws, which he called the Code Henri, in imitation of the Code Napoléon. Consult Hozard, *Santo Domingo, Past and Present: with a Glance at Haiti* (London, 1893), and Madiore, *Histoire de Haiti* (Port-au-Prince, 1897). See HAITI.

CHRIS'TOPHER, SAINT (Lat. *Christophorus*, from Gk. Χριστός, *Christos*, Christ + φέρειν, *pherein*, to bear; so the Christ-bearer). A saint of the Roman Catholic and Greek churches. He is supposed to have suffered martyrdom about the middle of the third century. According to vulgar legend, Christopher, whose name was originally Ἀδόκιμος, *Adokimos* (the ignoble, base), was a native of Palestine, Syria, or Lycia, and a person of prodigious bulk and strength. His height was 12 feet. So proud was he of his gigantic frame that he would serve only the mightiest princes. Having attached himself to one who passed for the greatest of his day, Christopher stayed with him for a short time, but soon discovered that his master was terribly afraid of the devil, in consequence of which Christopher, with fearless consistency, passed into the service of the latter. One day, however, when the devil and he chanced to be walking through a wood, they came across an image of Christ. His new master exhibited such perturbation and alarm at the sight that Christopher entirely lost confidence in him and resolved to find out the Saviour and follow him. For a long while he searched in vain, but finally he fell in with a hermit, who showed him Christ and baptized him. Christopher despised the customary penances, and, in consequence, it was imposed on him to carry Christian pilgrims on his shoulders over a stream which had no bridge. One day a little child came to the stream; Christopher took it on his shoulders, but soon began to sink under the weight of his burden. The child was Christ himself, and to prove it, he commanded Christopher to thrust his staff into the ground. He did so, and next morning it had blossomed into a palm tree bearing fruit. This miracle converted thousands to Christianity. Christopher's success excited the enmity of Dagnus, the prefect of that region, who put him in prison, scourged him with red-hot rods, put a burning helmet on his head, and clapped him on a burning stool. Christopher still remained uninjured. Multitudes of poisoned arrows were now discharged against him, but they rebounded from his charmed body, and one even wounded the prefect himself in the eye. Christopher pitied his tormentor and freely offered his head to the executioner, that the prefect might be healed by the blood which should flow from it. This was done, and Dagnus and his family became Christians. The Greek church celebrates his festival on May 9; the Roman Catholic, on July 25.

St. Christopher was greatly invoked in times of pestilence, or when people were digging for treasures, to frighten away the spirits who watched over them. The formula used was called a *Christopher's prayer*. He was also the patron of an order of moderation, founded in Austria in 1517 for the purpose of checking excessive drinking and swearing, and called the Order of St. Christopher.

CHRISTOPHER NORTH. The pen name of Prof. John Wilson (q.v.).

CHRISTOPHLE, krē'stō'fl', ALBERT SILAS MÉDÉRIC CHARLES (1830–1904). A French jurist. He was born in Domfront (Orne) and studied law in Caen. In 1876 he became Minister of Public Works in the Dufaure cabinet and greatly improved the department under his charge, placing competent engineers at the head of every branch of the service. He retained the portfolio of public works in the Simon ministry, but resigned with the rest of the cabinet in May, 1877. He was appointed director of the Crédit Foncier in 1878. In 1877 he traveled through France and visited several foreign countries (notably Holland) for the purpose of studying railroad improvements.

CHRISTOPH'ORUS. Pope from November, 903, to June, 904. He thrust out of office and imprisoned his predecessor, Leo V, only shortly afterward to experience the same treatment.

CHRISTOPULOS, krīs-tōp'ụ-lōōs, ATHANASIOS (1772–1847). A Greek poet, born in Kastoria in Macedonia. He studied in Buda in Hungary, and in Padua, and later became a judge successively in Jassy and Bucharest. In that capacity he prepared a legal code for Wallachia. He translated the fragments of Sappho and the first book of the *Iliad* into modern Greek and wrote a grammar of modern Greek (1805). His best-known work is his collection of Anacreontic songs (2 vols., 1833; in German, 1880), which has long continued popular in Greece. See ROMAIC LITERATURE.

CHRIST, or CRISSCROSS, ROW. The alphabet arranged in the form of a cross, as the symbols of Christ's crucifixion, for the use of children, and so printed in old hornbooks or

primers. The letter A was at the top and Z at the foot of the cross. By extension, any mark of a cross, but more especially one made by an illiterate person in lieu of his signature. See HORNBOOK.

CHRIST'S COLLEGE. A college in Cambridge, England, founded in 1506 by Lady Margaret Beaufort, Countess of Richmond and Derby, and mother of Henry VII. There was an older foundation called God's House, which had been established by William Byngham, rector of St. John Zachary, London, in 1439, for the study of grammar and the training of grammar-school teachers. It had consisted of a proctor and 24 scholars, but had fallen on evil days, in spite of the support of Henry VI, its second founder in 1448. It had lost its original site by being moved to make room for King's College, and had sunk in numbers and standing. It was refounded for a master, 12 fellows, and 47 scholars, and liberally endowed. Various additions were made to its numbers by gifts of Edward VI, Sir John Finch, and Sir Thomas Baines. There were, in 1913, 15 fellowships, 30 scholarships, several sizarships, some studentships in divinity, and 218 undergraduates. Among those who studied at Christ's are Archbishops Grindal and Bancroft, and Latimer, Cudworth, Quarles, Paley, Milton, and Darwin. Consult J. Peile, *Christ's College* (London, 1900).

CHRIST'S HOSPITAL. An English educational institution better known as the Blue-Coat School. It was founded on the site of the Greyfriars' Monastery, Newgate Street, London, by Edward VI, in 1553, as a hospital for orphans and foundlings. It has been one of the largest and most important schools of its class in England, including a large preparatory school for boys at Hertford, the boys' school at Horsham, and a girls' secondary boarding school at Hertford since 1779. Boys are admitted between 7 and 10 and discharged at 15, except the "King's boys," who attend the mathematical school (founded in connection with Christ's Hospital in 1672, by Charles II), and the "Grecians," the highest class of scholars, of whom four are annually chosen by examination to be sent to each of the universities, Oxford and Cambridge, on scholarships. The right of "presentation," or giving a boy or girl a place in the school, is vested in the managing governors, consisting of the Lord Mayor of London, the aldermen, and 12 common councilmen, besides the "donation governors," consisting of all noblemen and gentlemen who donate £500 to the school. The dress which has been worn by the boys since the days of Edward VI, and from which the school takes its name, is most picturesque. It consists of a long blue woolen gown or coat, reaching nearly to the feet, with a narrow red leather girdle around the waist, knee breeches and yellow stockings, and clergymen's bands. Originally a blue worsted cap was worn, but nowadays the boys generally go about bareheaded. The original building, nearly destroyed by the great fire of London, 1666, was restored after the designs of Christopher Wren, and this building in turn, having fallen into decay, was replaced in 1825 by Mr. Shaw. The Newgate Street property was in 1889 ordered sold, and the corner stone of the new institution was laid at Horsham (about 34 miles from London, in Sussex) in October, 1897. On April 18, 1902, the Blue Coats, assembled in the quadrangle, heard the farewell address of the head master. The school, which is conducted on the usual lines of an English public school, is attended by about 820 boys, who are boarded in 16 houses. The school is divided into three departments, the Latin or classical school, the mathematical or modern language school, and the preparatory school. Pupils are admitted by presentation or by competition, a certain number of places being reserved for pupils from public elementary schools. In the past there have been many distinguished men connected with Christ's Hospital, notably Coleridge, Lamb, and Leigh Hunt.

CHRIST'S THORN. See JUJUBE.

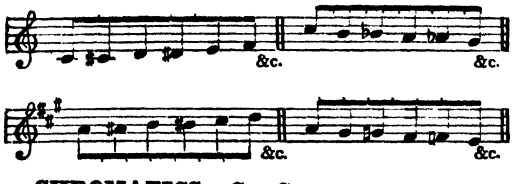
CHRISTY, krĭs'tĭ, HOWARD CHANDLER (1873–). An American painter and illustrator. He was born in Morgan Co., Ohio, and studied in New York at the National Academy and the Art Students' League under Chase. He first attracted attention with his illustrations of the Spanish-American War, published in *Scribner's* and *Harper's* magazines and in *Collier's Weekly*, gaining especial prominence with the series, "Men of the Army and Navy," and a portrait of Colonel Roosevelt. He is, however, best known for his charming illustrations of the works of such authors as Richard Harding Davis and has created a picturesque and romantic type of society women peculiarly his own. His work is characterized by great facility, a dashing but not exaggerated style, and a strong sense of values. He prefers black and white, but has also worked with success in color.

CHROBAK, krō'bák, RUDOLF (1843–1910). An Austrian physician, born in Troppau, Silesia. He studied in Vienna, where he became professor of obstetrics and gynæcology in 1879. His published writings include important works on anatomy and pathology within the domain of his specialty. These works form parts of the handbooks of Stricker (1869–72) and Pitha-Billroth (1885), and of Nothnagel's *Specielle Pathologie und Therapie* (1896).

CHROMÆSTHESIA, krōm'ĕs-thē'zĭ-ȧ. See COLORED HEARING.

CHRO'MATES. See CHROMIUM.

CHROMAT'IC (Fr. *chromatique*, It. *cromatico*, Lat. *chromaticus*, from Gk. χρωματικός, *chrōmatikos*, relating to color, from χρῶμα, *chrōma*, color, from χρώζειν, *chrōzein*, to touch, color, from χροά, *chroa*, χροιά, *chroia*, skin). In music, a term applied to a series of notes at the interval of a semitone from each other. Such a series is produced by dividing the whole tones of the diatonic (q.v.) scale into semitones, so that with the two diatonic semitones, already in the natural scale, the octave is divided into 12 semitones. Ascending chromatic passages are formed by the whole tones of the diatonic scale being raised or elevated by a sharp or a natural, according to key, and descending passages by their being lowered by a flat or a natural, thus:



CHROMATICS. See COLOR.

CHRO'MATIN (from Gk. χρῶμα, *chrōma*, color). In biology, a network of fine strands or aggregations of substance that occurs in the nucleus of the cell during its different phases

and has more avidity for staining agents than ordinary protoplasm. See CHROMOSOME; CELL.

CHROMAT'OPHORE (from Gk. χρῶμα, *chrōma*, color + φόρος, *phoros*, bearing, from φέρειν, *pherein*, to bear). A protoplasmic body in plants (see PLASTID), which contains or is capable of forming pigments. They are of three sorts, chloroplasts, chromoplasts, and leucoplasts (qq.v.).

CHRO'MATROPE (by haplology for **chromatotrope*, from Gk. χρῶμα, *chrōma*, color + τροπή, *tropē*, turn, from τρέπειν, *trepein*, to turn). An optical toy, consisting of a revolving disk on which are painted certain designs of various colors. These figures are so arranged that when the chromatrope is made to revolve rapidly streams of beautiful, brilliant colors seem to flow either to or from the centre of motion, according as the disk is made to rotate in one direction or the opposite. The same principle is utilized in the *chromatrope slide*, employed in magic-lantern exhibitions. In this, two circular disks of glass are placed face to face, each with a design radiating from the centre and painted with brilliant transparent colors. By a small pinion gearing in toothed wheels or endless bands, the disks are made to move in opposite directions in their own plane. The effect produced is a beautiful change of design and color.

CHROMATYPE. See CHROMOTYPE.

CHRO'MITE (from Gk. χρῶμα, *chrōma*, color), or **CHROME IRON ORE** ($FeOCr_2O_3$). An oxide of chromium and iron containing when pure 68 per cent chromic oxide and 32 per cent ferrous oxide. Commercial ores contain from 40 to 60 per cent of chromic oxide, together with alumina and magnesia. The color of the mineral is iron black to brownish black. In the United States commercial deposits have been found only in Pennsylvania, Maryland, North Carolina, Wyoming, and California. Statistics show a comparatively small production from the United States: 1880–95 the production averaged 2270 tons annually, valued at approximately $15 per ton; since 1895 the production in the United States has materially decreased; 1900–11 the production averaged about 244 tons annually, valued at $16 per ton. In 1912 the entire production came from California and amounted to 201 long tons, which was used locally for furnace linings. The chromo ore consumed in the United States is imported principally from New Caledonia, Greece, Canada, Great Britain, Asiatic Turkey, and Japan. The annual imports for four years ending in 1910 averaged 36,950 long tons and in 1911 amounted to 37,540 tons.

CHRO'MIUM (Neo-Lat., from Gk. χρῶμα, *chrōma*, color). A metallic element discovered by Vauquelin in 1797. It does not occur free, but is found in combination chiefly with iron as chromite, which is the principal ore of chromium, as crocoisite, a lead chromate, and as wolchonskoite, a native chrome ochre. Chromium is also a frequent constituent of meteoric iron, and the green color of emerald, serpentine, penninite, and other minerals, is due to this element. The metal is now best made by Goldschmidt's "thermit" process. A dry mixture of chromium oxide and powdered metallic aluminium is introduced into a crucible made of magnesia bricks, lined on the outside with iron, and capable of holding a charge of about 500 pounds. With the aid of a cartridge made of powdered aluminium and barium peroxide, the mixture in the crucible is "lighted" at the surface, whereupon the aluminium gradually burns up, withdrawing oxygen from the chromium oxide and reducing the latter to the state of pure metallic chromium. About 400 pounds of chromium can thus be obtained from a single crucible in the course of half an hour. It is in this manner that chromium is now made for the manufacture of chromium steel.

Chromium (symbol, Cr.; atomic weight, 52.0) is a grayish-white powder consisting of small, lustrous, very hard, brittle rhombohedral crystals which have a specific gravity of 6.92 at 20° C. (68° F.), and melt at a higher temperature than platinum. The metal itself has no important uses. But when added in quantities of less than 1 per cent to steel, it yields an alloy called *chromium steel*, which has a fine texture, great hardness, tenacity, and elasticity. An alloy of chromium with aluminium has also been described. With oxygen chromium forms two basic oxides, which yield, respectively, chromous and chromic compounds and an acid-forming oxide which yields chromates. Chromic oxide may be obtained by igniting the hydroxide or by heating a mixture of potassium bichromate and sulphur. It is a green pigment of great permanence that is known in commerce as *chrome green* and *ultramarine green*. The hydrated oxide, which is made by heating to dull redness 3 parts of boric acid and 1 part of potassium bichromate, is the pigment known as *emerald green*, *Guignet's green*, *Pennettier's green*, and *Veridian*. Of similar composition is the green pigment called *Arnaudon's green*.

Many of the chromates have considerable commercial value, especially those of potassium, sodium, and ammonium. Among the bichromates that of potassium is the most important, as it is used in the preparation of all other chromium salts. Potassium bichromate is prepared from chromite, the ore being, for this purpose, roasted, finely ground, and mixed with half its weight of potassium carbonate and twice its weight of lime; the mixture is heated to bright redness with an oxidizing flame in a reverberatory furnace, and, on cooling, the resulting mass is treated with hot water; to the solution thus obtained potassium sulphate is added for the purpose of precipitating the lime as sulphate, while the potassium chromate produced remains dissolved; finally, dilute sulphuric acid is added in order to convert the chromate into bichromate. Potassium bichromate crystallizes in the form of bright red prisms. It is used for the preparation of chrome pigments for the production of various colors in calico printing and dyeing; in the manufacture of safety matches; as a bleaching agent for tallow, palm oil, etc., with sulphuric acid; for the oxidation of anthracene to alizarin; in tanning leather; and in consequence of its property of rendering gelatin insoluble when mixed with that substance and exposed to light, it finds extensive application in photogelatin processes. *Lead chromate* is the bright yellow precipitate obtained when a solution of a lead salt is added to potassium bichromate; it is used as a pigment under the name of *chrome yellow*.

CHRO'MOLITH'OGRAPH. See LITHOGRAPHY.

CHRO'MOPLAST (from χρῶμα, *chrōma*, color + πλαστός, *plastos*, formed, from πλάσσειν,

plassein, to form). A protoplasmic body in plants which contains a pigment other than green, chiefly yellow or red. It is abundant in fruits and flower leaves. In shape the chromoplasts are rounded, fusiform, angular, or irregular, their form being often determined by the pigment they contain. Sometimes the pigment exists in minute droplets in the protoplasm, but more frequently it is crystalline; or both forms may be present together. The crystals vary from needle-like or rodlike to tabular. The slender crystals are sometimes curved and often occur in fascicles. Chromoplasts are derived from similar bodies by division. A plastid (q.v.), the primary undifferentiated body, may develop directly into a chromoplast, or it may be for a time a leucoplast (q.v.) or a chloroplast (q.v.), and only later produce the red or yellow pigment that characterizes a chromoplast. If the chromoplasts have any special function, it is not known. In a general way the color they impart may be useful, but the color is frequently due to products that hold no relation to further use. See CELL; COLOR IN PLANTS.

CHRO'MOSOME (from Gk. *χρῶμα, chrōma*, color + *σῶμα, sōma*, body). The name given to the loops or other aggregations of chromatin which collect in indirect cell division about the axis of the spindle and split into halves. The two halves move towards opposite poles of the spindle, where they aggregate and unite into the form of the chromatin of a new nucleus. See CHROMATIN; CELL; EMBRYOLOGY.

CHRO'MOSPHERE (Gk. *χρῶμα, chrōma*, color + *σφαῖρα, sphaira*, sphere). The envelope of incandescent gases which surrounds the body of the sun, or photosphere (q.v.), being separated from it by the reversing layer (q.v.). It consists principally of hydrogen, helium, and calcium, and varies in depth from 5000 to 10,000 miles. It was detected by observers of eclipses during the eighteenth and the early part of the nineteenth century, but it was not until 1842 that it was clearly recognized as a solar appendage and differentiated from the more diffused and fainter corona (q.v.) surrounding it. During a total solar eclipse the chromosphere is observed as a deep scarlet rim surrounding the moon's disk, but in broad daylight its brightness is overpowered by the greater brilliancy and whiteness of the light from the underlying photosphere. It is possible, however, to observe it at all times by means of the spectroscope. Its intense color, from which it derives its name, is due to incandescent hydrogen, its chief gaseous component. Many other gaseous elements, such as iron, chromium, magnesium, and titanium, are occasionally identified in the chromospheric spectrum, and it is supposed that these are due to the momentary injection into the chromosphere of the constituents of the reversing layer. Indeed, the chromosphere may be likened to a violently agitated ocean of red flame resting on the comparatively quiescent reversing layer. From the surface of this ocean jets and masses of glowing vapor rise from time to time, occasionally reaching an altitude of hundreds of thousands of miles, and form the "prominences" which are such a conspicuous feature during a total eclipse of the sun. These prominences were first noticed by Vassenius at Gothenburg in 1733, and were ascribed by him to the moon. Later observers agreed in supposing that they were a lunar phenomenon, and it was only in 1860 that Secchi and De la Rue demonstrated their solar origin, while their gaseous nature was not recognized until 1868. During the total eclipse of that year the bright lines due to hydrogen were seen, together with another in the orange, which was at first assumed to be the D line of sodium, but was afterward recognized as distinct, and attributed by Lockyer to a gas to which he gave the name "helium." This remained unknown as a terrestrial element until 1895, when Ramsay detected it in the mineral cleveite. Two kinds of prominences are recognized, cloud prominences and flame prominences. The former are quiescent and often continue without sensible change for several days, and, like the upper chromosphere, consist of hydrogen, helium, and calcium. They are frequently quite extensive in area and resemble huge cloud masses connected with the chromospheric surface by means of stemlike filaments. On the other hand, flame prominences are characterized by their jetlike form and by the extraordinary rapidity with which they spring up and disappear. They are usually associated with sun spots, and the presence of such elements as iron, titanium, sodium, scandium, barium, and titanium from the lower portions of the solar atmosphere indicates clearly their eruptive nature. Consult Clerke, *Problems in Astrophysics* (London, 1903); Schuster, *Solar Research* (London, 1909); Abbot, *The Sun* (New York, 1911). See SUN.

CHRO'MOTYPE, or **CHRO'MATYPE** (from Gk. *χρῶμα, chrōma*, color + *τύπος, typos*, type). A photographic process dependent upon the sensitiveness to light of certain chromium salts, especially the bichromates of the alkalies. The chromotype has been superseded by the photogelatin processes and is at present hardly ever used. (See AUTOTYPE.) The name is also applied to colored prints produced by "chromatic printing."

CHRON'ICLE (from *chronic*, Fr. *chronique*, It. *cronico*, Lat. *chronicus*, from Gk. *χρονικός, chronikos*, relating to time, from *χρόνος, chronos*, time). A species of historical record in which events are treated in detail and in the order of time. A chronicle is understood to differ from annals in being more connected and full, the latter merely recording individual occurrences under the successive years or other dates. A chronicle is not expected, however, to display either literary style or philosophic penetration. A great many of the older histories were called chronicles, such as the *Saxon Chronicle*, Holinshed's *Chronicle*.

CHRONICLE OF PA'ROS. An inscription discovered on the island of Paros in 1627, containing memoranda of much historic interest. It mentions various facts, especially the artistic ones, in Greek history. As a political and military history, the chronicle is faulty. See ARUNDEL MARBLES.

CHRONICLE OF THE KINGS OF ENGLAND, FROM THE TIME OF THE ROMANS' GOVERNMENT UNTO THE DEATH OF KING JAMES. An historical work by Sir Richard Baker, published in 1643, dedicated to Charles, Prince of Wales, containing a laudatory preface by Sir Henry Wotton. It was a very popular work for the century after its publication. It ran through seven editions before the close of 1684 and was translated into Dutch in 1649. In 1730 it was extended up to the reign of George II. It is, however, full of inaccuracies and was sharply criticized in 1672 by Thomas Blount, in a pam-

phlet published in Oxford. It was a favorite with Addison's Sir Roger de Coverley.

CHRONICLES (Heb. *Divrai hay-yamim*, events of the days, Gk. Παραλειπόμενα, *Paraleipomena*, omitted, sc. βιβλία, *biblia*, books). The name of two of the books of the Old Testament, which in the Hebrew canon form but one book, entitled "Book of Events of the Times." This appears to have been a designation commonly applied to special histories—such as, e.g., "Events of the Times of King David," or the like. The Greek translators divided the long Hebrew book into two and adopted the title "Things Omitted"—i.e., not recorded in the other historical books. Jerome suggested the title "Chronicon," whence comes the English name. The Book of Chronicles begins with Adam and ends abruptly in the middle of Cyrus's decree of restoration. The continuation of the narrative is found in the Book of Ezra, which repeats and then completes the fragment of the decree of the Persian King. Chronicles, in fact, formed originally one work with Ezra and Nehemiah, displaying throughout the peculiarities of a single author. The apparent separation of Ezra and Nehemiah from Chronicles proper is due to the insertion in the former of extracts from the memoirs of Ezra and Nehemiah and from other earlier documents. Of the authorship of Chronicles nothing is known except what can be determined by internal evidence. The language, and more particularly the syntax, implies that the book is one of the latest of the Old Testament. It is evident that the author lived a considerable time after Ezra and stood entirely under the influence of the religious institutions of the new theocracy. This point of view determined the nature of his interest in the early history of his people. The true importance of Hebrew history centres for him in the fact that this nation was the people of Yahwe. The tragic interest which distinguishes the annals of Israel from the forgotten history of Moab or Damascus lies wholly in that long contest which finally vindicated the reality of spiritual things and the supremacy of Yahwe's purpose by the political ruin of the nation which was the faithless depositary of these sacred truths. After the captivity it was impossible to write the history of Israel's fortunes otherwise than in a spirit of religious pragmatism. But within the limits of the religious conception of the plan and purpose of the Hebrew history, more than one point of view might be taken. The Book of Kings looks upon history in the spirit of the prophets. But before the Chronicler wrote, the older type of prophecy had become extinct. The Jerusalem of Ezra was organized no longer as a nation, but as a municipality and a church. The centre of religious life was no longer the prophetic word, but the ordinances of the Pentateuch and the liturgical service of the sanctuary. The religious vocation of Israel was no longer national, but ecclesiastical and municipal; and the historical continuity of the nation was vividly realized only within the walls of Jerusalem and the courts of the temple, in the solemn assembly and stately ceremonial of a feast day. These influences naturally operated most strongly on those who were officially attached to the sanctuary. To a Levite, even more than to other Jews, the history of Israel meant above all things the history of Jerusalem, of the temple, and of the temple ordinances. The author of Chronicles betrays in every page his essentially Levitical habit of mind. To such a mind there seemed to be room for a new history, which should confine itself to matters still interesting to the theocracy of Zion, keeping Jerusalem and the temple in the foreground, and developing the divine significance of the history in its causes and results, not so much with reference to the prophetic word as to the fixed legislation of the Pentateuch, so that the whole narrative might be made to teach that the glory of Israel lies in the observance of the divine law and ritual. For the sake of systematic completeness, the author of the Chronicles begins with Adam; but he had nothing to add to the Pentateuch, and the period from Moses to David contained little that served his purpose. He therefore contracted the early history into a series of genealogies, which were by no means the least interesting part of his work at a time when every Jew was concerned to prove the purity of his Hebrew descent. From the death of Saul the history becomes fuller and runs parallel with the books of Samuel and Kings. The limitations of the author's interest in past times appear in the omission, among other particulars, of David's reign in Hebron; of the disorders in his family and the revolt of Absalom; of the circumstances of Solomon's accession; and of many details as to the wisdom and splendor of that sovereign as well as of his fall into idolatry. In the latter history the 10 tribes are quite neglected, and political affairs in Judah receive attention, not in proportion to their intrinsic importance, but according as they serve to exemplify God's help to the obedient and His chastisement of the rebellious. That the author is always unwilling to speak of the misfortunes of good rulers is not to be ascribed to a desire to suppress the truth, but shows that the book was throughout composed not in a purely historic interest, but with a view to inculcate a practical lesson. The more important additions which the Chronicler makes to the old narrative consist partly of full details of points connected with the history of the sanctuary and the great feasts, or the archæology of the Levitical ministry, and partly of narratives of victories and defeats, of sins and punishments, of obedience and its reward, which could be made to point a plain religious lesson in favor of faithful observance of the law. The minor variations of Chronicles from the books of Samuel and Kings are analogous to the larger additions and omissions, so that the whole work has a consistent and well-marked character, presenting the history in quite a different perspective from that of the old narrative. It is still possible to determine within certain limits the nature of the sources which were employed by the author. He had before him the canonical books of Samuel and Kings, from which he made excerpts, but, in addition to these, had at his disposal "Midrashic" compilations, in which the past history was no longer told in sober fashion, but, embellished with more or less fanciful details, was intended as a means of illustrating religious ideas and of teaching moral lessons. He mentions such a Midrash of the Book of Kings (2 Chron. xxiv. 27), and also specifically refers to a Midrash of the prophet Iddo (2 Chron. xiii. 22), which appears to have been a separate work either attributed to Iddo or in which the prophet plays a prominent part. There were probably other works of a similar character in existence, and it is important to note that these compilations were based upon

the annals of the kings of Israel and Judah respectively, which also form the sources underlying the canonical books of Kings. The variations of the Chronicles from the latter, however, are due in most instances to his religious pragmatism. Everything is done to emphasize the ancient importance of the Levites, who are introduced at points and on occasions which are most inappropriate. He is also fond of high figures in enumerating sums and armies. The speeches introduced by him and put into the mouths of prominent personages also reflect entirely the Chronicler's peculiar point of view. Taking all this together, it is claimed by many that the historical value of Chronicles, where it varies from the books of Samuel and Kings, is small, and, except in some details, which have chiefly an interest as representing perhaps a more or less widespread tradition, there is a reluctance among modern critical scholars to depend upon it in the study of Hebrew history. From 1 Chron. iii. 19–24, where the genealogy of Zerubbabel is carried on through nine generations, as well as from the mention of Jaddua in Neh. xii. 11, 22, it has rightly been inferred that the Chronicles cannot have been written before the third century B.C.

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CHRONICLES OF THE CANONGATE. A series of tales by Sir Walter Scott. The first set, including *The Highland Widow*, *The Surgeon's Daughter*, and *Two Drovers*, was published in 1827; and the second, containing *The Fair Maid of Perth*, appeared in the ensuing year. They are supposed to be told by a certain Mr. Chrystal Croftangry, who, he informs us, got them from a Mrs. Baliol. See CANONGATE, THE.

CHRON'OGRAM (from Gk. *χρόνος, chronos*, time + *γράμμα, gramma*, letter, from *γράφειν, graphein*, to write), or CHRONOGRAPH. A whimsical device of the later Romans, resuscitated during the Renaissance period, by which a date is given by selecting certain letters among those which form an inscription, and printing them larger than the others. The principle will be understood from the following chronogram, made from the name of George Villiers, first Duke of Buckingham:

GEORGIVS DVX BVCKINGAMIÆ

The date MDCXVVVIII (1628) is that of the year in which the Duke was murdered by Felton at Portsmouth. Consult Hilton, *Chronograms* (1882).

CHRON'OGRAPH and **CHRON'OSCOPE** (Lat. *chronographus*, from Gk. *χρονογράφος, chronographos*, from *χρόνος, chronos*, time + *γράφειν, graphein*, to write; Fr. *chronoscope*, from Gk. *χρόνος, chronos*, time + *σκοπός, skopos*, watcher, from *σκοπεῖν, skopein*, to watch). Terms more or less interchangeable applied to instruments used in physics, physiology, psychology, and many departments of experimental and applied science, such as gunnery, for measuring very short intervals of time, as well as to instruments recording such measures. Chronograph watches, or pocket chronographs, will measure intervals of time down to fifths of a second, for use at horse races and other occasions where a seconds watch is not exactly suited. They have an ordinary quick-train lever movement, carrying hands which move over a dial. One of these is a seconds hand, very peculiarly made. The seconds hand is double, consisting of two distinct hands, one superposed on the other. As the double-seconds hand revolves, it is possible to stop one of its component halves by touching a spring at the side of the case. A record having thus been made of the exact fraction of a second marked by the position of the stopped hand, another pressure of the spring makes it fly back to its former position on the moving component. The instrument is then ready for another observation. There are numerous modifications of this form of instrument; they are sometimes called stop watches, or split-second fly-back watches.

The Astronomical Chronograph is used to record permanently the exact instants of time when certain astronomical observations are made. Such a time record is, of course, extremely important in almost all forms of astronomical work. As usually constructed, the instrument consists of a metal cylinder or drum, upon which is wound a sheet of paper to receive the record. The drum is connected with a clockwork apparatus which makes it turn on its axis once each minute. At the same time a fountain pen, or some other form of marking instrument, is pressed against the paper so that a line is traced around the drum as it turns. The pen is attached to an electromagnet, which in turn is moved very slowly by the clockwork along the axis of the drum. The result of these motions of the drum and pen is to trace a continuous spiral line on the paper around the drum. The electromagnet is connected with the astronomer's standard clock by wires, and once every second an electric signal is sent automatically by the clock into the magnet. This results in a short interruption or break in the line traced by the pen. Such a break, then, marks the beginning of each second on the chronographic time record. When the astronomer wishes to record the exact time of an observation, he has but to tap a telegraphic key held in his hand, and a signal similar to the clock signals will reach the chronographic electromagnet. The result is a break in the record line, similar to those due to the clock. It is then merely necessary to measure the position of the observer's break with reference to the clock breaks, to fix the exact fraction of a second corresponding to the observation. There is little difficulty in thus measuring a chronographic record to the twentieth part of a second of time. In the form of instrument known as the "printing chronograph," in-

vented by Professor Hough of the Dearborn Observatory, the minutes, seconds, and fractions of a second are actually printed on the record sheet. Another form of chronograph is the photochronograph, in which the trail of a star is photographed directly with the spider lines of the telescope on a photographic plate. To mark the time intervals, the plate is given a slight north and south displacement at the beginning of each second, so as to produce a break in the star trail. In this way the recording of the transit of a star becomes purely automatic, and the personal equation (q.v.) of the observer is avoided.

The first attempt to measure a very small period of time was made by Sir Charles Wheatstone in 1834, when he endeavored to ascertain the duration of the electric spark. This was accomplished by means of a revolving mirror; and as this apparatus was the first and simplest of a number of similar instruments, it may be described at some length. On a horizontal axis capable of being revolved at high speed, a mirror was fixed. The rays issuing from a luminous point, such as a small flame, were reflected from the mirror when at rest and reached the eye of the observer. If the mirror is slowly revolved, the image of the luminous point will be either raised or lowered, and if the speed of rotation is increased, instead of a succession of images there will be seen a continuous streak or band of light. If the given source of light be supplanted by an electric spark, and the mirror set in rotation, as long as the duration of the spark is less than is required by the mirror to reflect the rays across the field in the form of a band, then the spark will appear as a point; but, increasing the speed of the mirror, a stage will be reached where the image will be produced in the form of a bright streak. The time of the spark can then be calculated in the following way: First, the velocity of the mirror is observed; then, suppose that the image of the spark extends over what is equivalent to one-half a degree of arc. As the movement of the reflected ray is, from the laws of reflection, twice that of the reflecting mirror, it would follow that when the mirror was revolving at a velocity of 800 revolutions per second, the time consumed by the mirror in causing the spark to appear as a streak of light would be $\frac{1}{800} \times \frac{1}{2} \times \frac{1}{720} \times \frac{1}{2}$ or $\frac{1}{1152000}$ of a second.

Wheatstone also employed this apparatus to study the time consumed by an electric current in passing over a conductor, using for this purpose the sparks furnished at different lengths of the conductor and measuring the difference in time between their occurrences. A rotating mirror was also used by Feddersen in his researches on the electric spark, and again by Rood, the former employing a concave mirror, while the latter used a plane mirror in connection with a system of lenses.

To Wheatstone is due another form of chronoscope, which was used for measuring the velocity of a projectile from the time it left a cannon until any desired point was reached. (See BALLISTICS.) This apparatus in its essence consisted of a clock which was set in motion and stopped by the armature of an electromagnet. Across the muzzle of the gun a wire was placed, which was broken at the exit of the projectile, and the circuit opened, thus releasing the armature of the electromagnet and setting in motion the clockwork. When the shot reached the required distance, the circuit was closed, and the clock stopped in a similar fashion. Wheatstone did not claim a greater accuracy for this instrument than to $\frac{1}{10}$ of a second, but improvements by Hipp, who, keeping the clockwork in motion, used the magnets only to throw the indicating part of the apparatus into gear with the movement, made the instrument more serviceable.

W. Siemens used a rapidly rotating cylinder, on a paper covering of which sparks from a circuit containing Leyden jars made the record marks. The introduction of a seconds pendulum into the circuit gave a record of the time by causing spark punctures at regular intervals, and the desired times could be found by comparing the distances. With this apparatus the velocity of a projectile while in the bore of the cannon could be measured, it being only necessary to insert insulated conductors at different points where the circuit could be made or broken by the traveling shot. Siemens also used this form of chronoscope, or chronograph, to measure the velocity of the electric current. Helmholtz improved the instrument by providing mechanism to give a constantly increasing velocity, making his measurement when the desired rate of speed was reached, the regulation being effected by the action of centrifugal force. This form of instrument has been employed extensively in physiological work, and there are numerous modifications now in use.

Tuning forks (see TUNING FORK) are also employed extensively for measuring small intervals of time, as they furnish an extremely accurate means for making such determinations. A device used by Pouillet was a circular disk of glass on which was a smaller circle of tinfoil and a narrow strip extending to the circumference. This was used to complete an electric circuit with a galvanometer, the principle involved being that with a continuous current for an extremely brief space of time, the strength of the current and consequently the deflection of the galvanometer is proportional to the time it is flowing.

In the Noble chronoscope, extensively used in artillery tests, there are eight bronze rotating disks, each covered with a strip of blackened paper, on which a record is made by means of an electric spark. This instrument is used to measure both internal and external velocities, as is also the Schultz chronograph, which employs a tuning fork and electromagnets. The velocity of different distances is obtained by having the circuit opened or closed by means of the wires of a screen through which the projectile passes. In an instrument for a like purpose, the invention of Crehore and Squier, the record is obtained by means of a beam of polarized light falling on a rapidly revolving photographic plate. In this instrument the plane of polarization is shifted by the action of a magnetic field produced on closing the circuit. When a current flows, the beam is rotated so that it does not affect the plate, leaving a blank in the path traced by the beam. A tuning fork is used to keep track of the time, and by means of the wavy line traced by it the time between interrupted points on the tracing of the first beam may be ascertained.

The Boulengé chronograph, much used in artillery tests of velocity, depends upon the distance a body falls in a given interval of time. It will be found discussed and illustrated in

the article on BALLISTICS. The chronoscope and chronograph are also constructed in numerous other forms, in some of which, e.g., the principle of the pendulum is employed, and time can be measured with an extreme degree of accuracy.

The instruments of Fizeau and Foucault to measure the velocity of light must be considered among the early forms of those instruments. In the former a wheel with projecting teeth was used to interrupt a beam of light which was sent to a distant mirror and back. The speed of the mirror was so adjusted that the beam of light which is transmitted through the space between two teeth is received after reflection in the next open space, and the velocity determined by ascertaining the distance traveled by the beam and the time consumed in the fraction of a revolution of the toothed wheel. Foucault used a revolving mirror, as did also Michelson, whose determinations are considered most reliable and accurate.

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CHRONOL'OGY (Fr. *chronologie*, from Lat. *chronologia*, from Gk. χρονολογία, *chronologia*, from χρόνος, *chronos*, time + λόγος, *logos*, account). The branch of science which treats of time as measured, computed, and recorded. Its object is to establish some method of defining time, to compute the intervals between important historical events, and to fix the dates of events uniformly with reference to some chosen point in the history of the world.

The familiar units of time are the year, the month, and the day. These are astronomical and are determined by recurring celestial phenomena. The epoch universally employed today, before which and after which events are said to have occurred, is the birth of Christ. The years before Christ are marked B.C. and those after A.D. (Anno Domini). The astronomical units, however, have not always been employed, and the epoch or reckoning point differed among various peoples. Thus, in early days, such vague periods as generations, or reigns of kings, were assumed as units: but finally, through the suggestion, it is said, of the philosopher Eratosthenes, who was in charge of the library in Alexandria, in the third century B.C., the year was introduced as the unit of time. The difference in epochs led to various suggestions which were gradually discarded with the spread of civilization and the closer intercourse of men. The systems used by the Greeks and Romans were the most important in antiquity. The Greeks calculated by Olympiads, beginning their era from the years of the victory of Corœbus in the Olympic games, which corresponds to the year 776 B.C. The Romans began their era from the founding of the city, generally accepted as the year 753 B.C.

The study of the astronomical units and the measurement of time belong to the department of mathematical astronomy. The historian employs chronology to enable him to transfer events in history located in time according to various eras to his own system, the Christian era.

The method of reckoning time by Olympiads was used by the historian Timæus about 240 B.C. and was generally adopted by other Greek historians. The Olympiads were determined by the Olympic games, which were held every four years in the summer time. The Olympic year therefore begins in the middle of our year, and the first and latter half of our year belong to different Olympiads. Thus, Socrates was put to death in the first year of the 95th Olympiad. The reckoning is as follows: $94 \times 4 = 376$; this subtracted from 776 gives 400, but his death took place in the eleventh month, hence 1 should be subtracted, so that 399 B.C. is the year of his death with reference to the Christian era. If the date falls after Christ, 776 must be subtracted from the Olympic year. The calculation by Olympiads lasted down to the fifth century of our era.

The date of the foundation of Rome is given by Fabius Pictor in a year corresponding to 747 B.C., by Polybius in 750 B.C., by M. Porcius Cato in 751 B.C., by Verrius Flaccus in 752 B.C., and by Terentius Varro in 753 B.C. Among Roman writers Livy follows Cato and at times Fabius Pictor. Cicero and Pliny follow Varro. The Varronian date is generally accepted by modern writers. The years were designated by the letters A.U.C. (*anno urbis conditæ* = in the year from the foundation of the city). In changing from the Roman to the Christian era, subtract the years of Rome from 754 if the date is before Christ, but if the date is after Christ, subtract 754 from the year of Rome.

The Greek and Roman methods continued in use long after Christ. Constantine the Great is said to have introduced the system known as indiction. This was a cycle of 15 years, which were denoted Indiction 1, Indiction 2, up to Indiction 15, when the series began anew. There are four kinds of indictions, which owe their difference merely to the fact that they are reckoned from different days. Thus the Indiction of Constantinople began with Sept. 1, 312 A.D.; the Imperial, on Sept. 24, 312 A.D.; the Roman or Pontifical, on Dec. 25, 312 A.D., or Jan. 1, 313 A.D. As 1 A.D. equals Indiction 4, add 3 to the year of the Christian era and divide by 15, and the remainder will be the number of the indiction. If there is no remainder the indiction is 15.

The year of the Christian era, as now arranged, like the Julian year, established by Julius Cæsar, extends from January 1 to December 31. The Christian era was first used by Dionysius Exiguus in 533 A.D. He regarded the birth of Christ as taking place in the year of Rome 754, although early Christians placed it in 750. The Dionysian year, however, dated from the Annunciation, March 25 of the preceding year. The commencement of the year was assigned to different days in different places.

Thus in England down to the Conquest it was counted from Christmas or from March 25; from the Conquest to 1155, from January 1; from 1155 to 1751, from March 25. In Scotland the beginning of the year was changed from March 25 to January 1 in 1600, but the change was not generally adopted until it was made in England also. In France the beginning of the year varied in different dioceses, being either Christmas or March 25, until 1564, when January 1 was selected. In the middle of the sixteenth century January 1 was determined upon in Germany, Italy, Spain, and Portugal.

The era of the creation of the world is obtained from the Old Testament, but varies in the different texts. The Hebrew version reckons 1656 years from creation to the flood and 4000 years from creation to the birth of Christ. The Samaritan makes the latter interval much longer, though it counts from the creation to the flood only 1307 years. The Septuagint version removes the creation of the world to 6000 years before Christ and 2250 years before the flood. It is now, however, universally admitted that the creation of the world cannot be placed at so recent a date as 6000 B.C., and the modern understanding of the first chapter of Genesis leaves the period of the creation quite indefinite, and one scheme of interpretation stretches out the days of creation into periods of indefinite length. Des Vignoles, a writer on the chronology of sacred history, collected more than 200 different estimates of the era of the creation, the shortest being 3483 and the longest 6984 years. If such or such a date from the creation means anything, it is probably to be read by the date fixed by Archbishop Ussher, which was 4004 B.C.

Various other eras are worthy of mention. The era of Constantinople dates the creation of the world 5508 years and 4 months before the beginning of our era, the civil years beginning September 1, the ecclesiastical March 21 or April 1. The era of Alexandria used by the Christians of that city placed the creation of Adam 5500 years before the birth of Christ. We must allow three years for the date assigned by the early Christians to the Incarnation. Hence we may change dates of this era to our own by subtracting 5502. When Diocletian became Emperor, 10 years were omitted, and after that date, which is 5786 according to the Alexandrian era, we must subtract 5492. The mundane era of Antioch, used by the Christians of Syria, is the same as the Alexandrians after the time of Diocletian. The Julian period should be mentioned here. It was invented by Joseph Justus Scaliger in 1582 to obviate the inconvenience of counting in two ways, before and after Christ. He estimated a period of 7980 Julian years, and the first year of the Christian era corresponded to 4714 of his era. The era of Nabonassar, which obtains its name from the founder of the Kingdom of Babylon, was used by astronomers. Its date is Feb. 26, 747 B.C., which was calculated from records of Ptolemy, based on celestial phenomena. The Macedonian era, known also as that of the Seleucidæ, began on September 1 of the Julian year, 312 years before our era. The era of Spain, used in Spain, Portugal, Africa, and parts of France, dated from the conquest of Spain by Augustus in 38 B.C. The era of Diocletian, or era of martyrs, still followed by the Copts and Abyssinians, is reckoned from Sept. 17, 284 A.D. The Mohammedan era of the Hejira (q.v.) dates from the flight of Mohammed from Mecca in 622 A.D. The following table gives the precise dates of the beginning of the eras just mentioned and of others of less importance:

	B.C.
Grecian, Mundane	September 1, 5598
Constantinople, Civil	September 1, 5508
Alexandrian	August 29, 5502
Antioch, Mundane	September 1, 5492
Julian Period	January 1, 4713
Mundane, Ussher	October 4004
Mundane, Jewish	October 3761
Abraham	October 1, 2015
Olympiads	July 1, 776
Rome, Foundation of	April 24, 753
Nabonassar	February 26, 747
Metonic Cycle	July 15, 432
Macedonian, or Grecian	September 1, 312
Tyrian	October 19, 126
Maccabean	November 24, 166
Sidonian	October 110
Cæsarian, of Antioch	September 1, 48
Julian Year	January 1, 45
Spanish Era	January 1, 38
Actian	January 1, 30
Augustan	February 14, 27
	A.D.
Christian	January 1, 1
Era of Diocletian	September 17, 284
Armenian	July 7, 552
Mohammedan, of the Hejira	July 16, 622
Persian, of Yezdegerd	June 16, 632

Various other systems of chronology may be found mentioned under the names of the nations by whom they were employed. Consult: Nicholas, *Chronology of History* (London, 1838); Woodward and Cates, *Encyclopædia of Chronology*, historical and biographical (Boston, 1872); Macdonald, *Chronologies and Calendars* (1897); Grotefend, *Taschenbuch der Zeitrechnung* (Leipzig, 1905); Arbuthnot, *The Mysteries of Chronology* (London, 1900). See also CALENDAR; YEAR; MONTH; DAY; CYCLE; ETC.

CHRONOM'ETER (Fr. *chronomètre*, It. *cronometro*, from Gk. *χρόνος, chronos*, time + *μέτρον, metron*, measure). The name given principally to such timekeepers as are used for determining the longitude at sea. The mechanism is essentially the same as that of a common watch, only the size is generally greater; the balance wheel is compensated for variations of temperature; and the whole instrument is hung in a frame of balancing rings called "gimbals." These prevent the ship's motion from influencing the chronometer's rate too much.

CHRON'OSCOPE. See CHRONOGRAPH.

CHRUDIM, krōō'dĕm. A town in the eastern part of Bohemia, Austria, situated on the river Chrudimka, 74 miles by rail from Prague. It has a number of churches, among them one dating from the thirteenth century. Its principal industries are the making of sugar, liquors, meal, leather, shoes, cloth, and agricultural machinery. Pop., 1890, 12,128; 1900, 13,017.

CHRYSALE, krē'zàl'. The henpecked husband of Philaminte in Molière's *Les femmes savantes*. He is the type of a *bon bourgeois*, and, though under the domination of his *précieuse* wife, is inspired by the love he bears his daughter Henriette to assert his authority and save her from the base Trissotin.

CHRYSALIS, krĭs'ă-lĭs. See BUTTERFLIES AND MOTHS.

CHRYSANDER, krē'sän-dĕr, FRIEDRICH (1826–1901). A German writer on the science of music. He was born in Lübtheen, Mecklenburg-Schwerin, and studied philosophy in Rostock, but later gave up his time entirely to musical study. He has contributed extensively to the literature of this subject and is especially

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1 SINGLE ANNUAL CHRYSANTHEMUM – CHRYSANTHEMUM CARINATUM
2 PYRETHRUM – C. COCCINEUM
3 OX EYE DAISY, WHITE WEED – C. LEUCANTHEMUM
5 POMPON CHRYSANTHEMUM
6 JAPANESE CHRYSANTHEMUM INCURVED TYPE
7 RECURVED TYPE

well known as the editor of Handel's works, his edition having been the first to be prepared from the original sources. The edition was really published by Chrysander as a private enterprise, more particularly after the death of his collaborator, Gervinus, in 1871, when, equipped with a simple hand press and assisted by only one printer and one engraver of music, he continued the publication of the work at his own expense, in this way completing all but three of the 100 volumes. This gigantic undertaking occupied the editor from 1859 to 1894, during which time he repeatedly visited England for the purpose of studying the autograph scores. Foremost among the striking improvements introduced by Chrysander into this famous edition are the following: a new German translation of the original English text, emphasizing the relation between word and tone; the concentration of the dramatic element; the restoration of the original ornamentation of the arias; and, most important of all, the restoration of the original Handelian orchestration. While working on this monumental edition of the master's works, Chrysander also embodied the wealth of information he had collected in an exhaustive biography, of which, however, only two volumes were completed. A portion of the third volume brings the life down to the year 1740. Unfortunately this greatest biography of Handel has never been completed, although the publishers have made several attempts to induce eminent scholars to undertake the task.

CHRYSAN'THEMUM (Lat. from Gk. *χρυσάνθεμον, chrysanthemon,* from *χρυσός, chrysos,* gold + *ἄνθεμον, anthemon,* flower). A genus of plants of the family Compositæ, comprising some 200 species, natives of Europe, Asia, and northern Africa. The plants of this genus are free bloomers in both the wild and cultivated state. The flower heads are either flat or hemispherical; solitary on long peduncles or in flat-top clusters. Usually the rays spread wide open and are conspicuously showy, white, yellow, or rose-purplish in tint, while the disk flowers are for the most part yellow.

The name "chrysanthemum" is popularly restricted to the many garden and greenhouse forms of Europe and America, all of which are the blended offspring of two distinct Chinese and Japanese species, *Chrysanthemum indicum* and *Chrysanthemum sinense.* Through a continued process of cross fertilization and selection a remarkable diversity of color, shape, and size has been developed in these flowers. They range all the way from the true pompon, or button form, to the huge head that measures nearly 8 inches in diameter, with ray florets 3 or 4 inches in length. In shape they are quilled, twisted, hairy, or plain, double, semidouble, and single, with florets erect, incurved, or reflexed. They are of nearly all colors and shades. The varieties are generally wanting in fragrance, although an occasional sweet-scented form occurs. The chrysanthemum has long held first place as an autumn garden and exhibition flower. In the cut-flower trade of America it is outranked only by roses and carnations. The national chrysanthemum societies of England and America, as well as numerous other horticultural and floral societies, have done much to direct the popular taste away from freakish and fantastic forms and to encourage the production and perpetuation of varieties of merit. The types correspond approximately both in Europe and America as also in Australasia. The many hardy dwarf or pompon types and the early large-flowering types are best for the garden. Many of the pompons retain their beauty until severe freezing weather sets in. Of the large flowers, the Japanese reflexing forms in many colors are rather favored in America, while in England these are slowly giving place to singles and semidoubles. Chrysanthemums are easily propagated from rooted ground shoots. Florists prefer to treat these shoots as cuttings. The plants will endure varied soil and cultural conditions. They grow best in a rich and well-tilled soil. The art of disbudding, practiced by professional florists to secure large well-formed flowers, should be accompanied by a knowledge of varietal tendencies as well as of the different flower buds and their qualities. Consult: Bailey, *Cyclopedia of Standard Horticulture;* Herrington, *The Chrysanthemum: Its Culture for Professional Growers and Amateurs* (New York, 1905); Powell, *Chrysanthemums and How to Grow Them* (Garden City, N. Y., 1911).

Chrysanthemum leucanthemum is the oxeye daisy of pastures in the Atlantic States. Another species, *Chrysanthemum segetum,* is the corn marigold of Europe. *Chrysanthemum frutescens,* known in France as marguerite, and widely cultivated in that country for ornamental purposes, has found its way into other lands and is grown either in pot culture or, where the climate will allow, in the open air.

CHRYSAOR, krī-sā'ôr *or* krīs'ā-ôr (Lat., from Gk. Χρυσάωρ). 1. The son of Poseidon and Medusa, in Greek legend. He sprang from his mother's head when she was decapitated by Perseus. He was father of Geryon (q.v.). 2. The name of Artegal's sword in Spenser's *Faerie Queene.*

CHRYSAROBIN, krīs'ā-rō'bĭn (Neo-Lat. *chrysarobinum,* from Gk. *χρυσός, chrysos,* gold + E. Ind. *aroba,* bark of leguminous trees). Goa powder (q.v.).

CHRYSE CHORA, krī'sē kō'rā (Gk. Χρυσῆ Χώρα, Golden Land). A name given by the ancients to a part of India comprising the present Burma and the northern part of Pegu.

CHRYSEIS, krī-sē'ĭs. In the *Iliad,* the daughter of Chryses, priest of Apollo at Chryse. When she fell to the share of Agamemnon in the distribution of spoils during the Trojan War, the ransom offered by her father was harshly refused by Agamemnon. Apollo, to punish the slight to his priest, sent a pestilence on the Greek camp, which was averted only by the return of Chryseis to her father. See ACHILLES.

CHRYSELEPHANTINE, krīs'ĕl-ē-făn'tīn (from Gk. *χρυσελεφάντινος, chryselephantinos,* of gold and ivory, from *χρυσός, chrysos,* gold + *ἐλεφάντινος, elephantinos,* made of ivory, from *ἐλέφας, elephas,* ivory, elephant). The art which prevailed among the Greeks of covering some of their statues with ivory and gold. The body of these figures was usually of wood over which a thin plating of ivory was fastened, and certain portions of the garments were made of gold. The hair, also, was of gold. These garments and the hair were usually chased. (See CHASING.) The modeled body of these statues belonged to the art of sculpture, while the chasing and ornamentation of the draperies and hair was called toreutic art. The statues were mainly of religious character and used for the ornamentation of temples. Winckelmann has calculated that

about 100 statues of this kind are mentioned by the ancients. The colossal works executed by Phidias (q.v.) in the time of Pericles are the most famous of this class, the greatest being the Pallas of the Parthenon. It was 26 cubits high and represented the goddess in armor, covered with a long robe. Even grander was the famous Olympian Zeus, which was considered one of the seven wonders of the world. Another famous chryselephantine statue was that of Hera in her temple at Argos, by Polyclitus (q.v.).

CHRYSES, krī'sēz. See CHRYSEIS.

CHRYSIPPUS, krī-sĭp'pŭs (Lat., from Gk. Χρύσιππος) (c.280–207 B.C.). An eminent Stoic philosopher of Soli in Cilicia. He came to Athens when still a youth and eagerly devoted himself to philosophical pursuits, especially under Cleanthes, the successor of Zeno, although he is said to have studied also under the Academic teachers, Arcesilaus and Lacydes, and to have learned from them what were the objections urged by skeptics against the doctrines of the Stoics. He possessed an eager, facile, and catholic mind, and enjoyed the reputation of being the keenest disputant of his time; yet his discourses were clever and subtle rather than seriously argumentative. It was his common practice to take at different times opposite sides of the same question, so that he furnished his opponents, especially Carneades, with the means of convicting him of inconsistency. In philosophy he was an expounder, not an originator. His literary industry was great. He is said to have written no fewer than 500 lines each day, and Diogenes Laërtius speaks of over 705 books by him. These dealt with philosophy proper, logic, physics, ethics, grammar, and the interpretation of the poets; only fragments remain in the works of Plutarch, Ælian, Cicero, Seneca, and Aulus Gellius. These were edited by Petersen, 1827; Ritter and Preller (Gotha, 1886–88). Consult: Baguet, *De Chrysippi Vita, Doctrina et Reliquiis* (Paris, 1882); Zeller, *Philosophie der Griechen* (Leipzig, 1881); Hicks, *Stoic and Epicurean* (New York, 1910); Bevan, *Stoics and Sceptics* (Oxford, 1913).

CHRYS'OBER'YL (from Lat. *chrysoberyllus*, from Gk. χρυσοβήρυλλος, golden beryl, from χρυσός, *chrysos*, gold + βήρυλλος, *bēryllos*, beryl). A beryllium aluminate that crystallizes in the orthorhombic system. It has a vitreous lustre and is found in various shades of green and is sometimes red by transmitted light. The greenish varieties showing a chatoyant effect are called cat's-eye, while opalescent specimens are named *cymophane*. Chrysoberyl was known to the ancients and was called *Oriental chrysolite* or *Oriental topaz*. It is found in Brazil, Ceylon, and in the Ural Mountains. A variety of an emerald-green color, but red by transmitted light, is called *alexandrite*, in honor of the Czar Alexander II. In the United States chrysoberyl occurs at Haddam, Conn., and at Norway, Stow, and several other localities in Maine. The largest transparent crystals are frequently cut into gems.

CHRYS'OCOL'LA (Neo-Lat., from Gk. χρυσόκολλα, *chrysokolla*, gold solder, from χρυσός, *chrysos*, gold + κόλλα, *kolla*, glue). A hydrated copper silicate that is cryptocrystalline. Chrysocolla is found in green to blue masses with an enamel-like texture. Impure varieties often occur in earthy masses, green or dull brown in color. It occurs with other copper minerals, especially in the upper parts of veins. It is found in Cornwall, England; Hungary; Siberia; Australia; Chile; and, with other copper ores, in New Jersey, Pennsylvania, Wisconsin, Michigan, Arizona, and elsewhere in the United States. When found in sufficiently abundant quantities, it is a valuable ore of copper, as it contains when pure 45 per cent of copper oxide. The name "chrysocolla" was applied by the ancients to any green mineral, as malachite, containing copper and capable of being used as a pigment.

CHRYS'OLITE (from OF. *crisolite*, Fr. *chrysolithe*, from Lat. *chrysolithos*, Gk. χρυσόλιθος, *chrysolithos*, from χρυσός, *chrysos*, gold + λίθος, *lithos*, stone). A magnesium-iron silicate that crystallizes in the orthorhombic system. It is of a green color, varying from yellow to brown, with a vitreous lustre, and when cut is prized as a gem stone, the gem varieties being known as *olivin* and *peridot*. Chrysolite is frequently found in lava as at Vesuvius, and in the volcanic rocks of Sicily, the Azores, the Hawaiian Islands, and elsewhere; it is also a frequent and important rock constituent. In the United States it is found in the form of small, olive-green, pitted grains or pebbles, with garnet, in Arizona and New Mexico, where the grains are called "Job's tears" on account of their pitted appearance. It also occurs in basalt near Montreal, and elsewhere in Canada. The so-called chrysolite of the jeweler is usually chrysoberyl, and the *chrysolithus* mentioned by Pliny is supposed to have been topaz. It is said that many of the so-called emeralds in European churches, as those of the "Three Magi" in the cathedral of Cologne, are chrysolites, and not emeralds. See GEMS.

CHRYSOLOGUS, krī-sŏl'ō-gŭs (Lat., from Gk. χρυσόλογος, from χρυσός, *chrysos*, gold + λόγος, *logos*, speech; referring to his oratorical powers), PETER (406–450). Bishop of Ravenna in 433. He opposed Arianism and Eutychianism. About 100 genuine sermons of his have come down to us, though there are 76 others attributed to him. They do not bear out his reputation for eloquence, but show an earnest and spiritually minded nature. His works are in Migne, *Patrologia Latina*, lii. There is a partial translation into German by M. Held (Kempfen, 1874). For his life, consult H. Dapper (Cologne, 1867) and F. V. Stablewski (Posen, 1871).

CHRYSOLORAS, krĭs'ō-lō'răs, MANUEL (c.1355–1415). A Byzantine Greek scholar, the first important teacher of Greek of the Renaissance. His scholarship became famous in Italy, so that Guarino da Verona went to Constantinople to learn Greek from him. About 1393 he was sent by the Byzantine Emperor, Manuel Palæologus, to the West to ask assistance from Italy and England against the Turks. While on this mission he became known to many Italians, and in 1396, being invited by the Florentine Republic, he settled in Florence as a teacher of Greek literature. Within the next two years Chrysoloras had among his pupils Niccolò Niccoli, Leonardo Bruni, Manetti, and others.

In 1400 he left Florence, and two years later was teaching in Pavia, where he translated Plato's *Republic* into Latin. During the next decade he seems to have traveled in France, Spain, and England, and to have been engaged in teaching Greek in a number of Italian cities. He was employed by Pope Gregory XII in an attempt to bring about the union of the Greek and the Roman churches. He accompanied John

XXIII. to the Council of Constance and died while it was in progress.

His most important work was his *Erotemata*, the first Greek Grammar published in western Europe (Venice, 1484), which was for many years the standard work for Greek teaching in Italy and elsewhere. Another interesting work was his comparison of ancient and modern Rome (*Σύγκρισις παλαιᾶς καὶ νεᾶς Ρώμης*). Consult Voigt, *Die Wiederbelebung des klassischen Alterthums*, i (Berlin, 1895), and Symonds, *Renaissance in Italy*, ii (London, 1877).

CHRYS'OPRASE (from Lat. *chrysoprasus*, Gk. *χρυσόπρασος*, *chrysoprasos*, from *χρυσός*, *chrysos*, gold + *πράσον*, *prason*, leek). A variety of chalcedony, the apple-green color of which is due to the presence of a small quantity of nickel oxide. It is found in Silesia, Germany, and near Riddles, Oregon, where it occurs in nickel ore in veins over an inch thick; also in Tulare Co., Cal. Chrysoprase was formerly much sought after as a gem stone, but as it loses its color if kept in a warm place, it is no longer much prized. It is mentioned in the Bible, and by the ancients was described as a gem of a yellowish-green color, the identity of which has never been definitely established. *Chrysoprase earth* is the name given to an apple-green variety of pimelite from Silesia.

CHRYSOSTOM, krĭs'os-tom *or* krī-sŏs'tom (from Gk. *Χρυσόστομος*, *Chrysostomos*, golden-mouthed, from *χρυσός*, *chrysos*, gold + *στόμα*, *stoma*, mouth; so named from the splendor of his eloquence), JOHN, SAINT (c.345–407). One of the greatest fathers of the early Church. He was born in Antioch in 345 or 347 A.D. He came of a patrician family. His father, Secundus, died soon after Chrysostom's birth. His mother, Anthusa, was a pious woman, wholly devoted to her son, who grew up under her loving instructions into an earnest, gentle, and serious youth, passing through none of those wild, dark struggles with sinful passions which left an ineffaceable impress on the soul of Augustine and gave a sombre coloring to his whole theology. He studied oratory under Libanius, a heathen rhetorician, as he at first intended to be a jurist, and soon excelled his teacher; but, feeling called to give up worldly pursuits, he abandoned legal for biblical study. About 368 he was baptized and was ordained a reader. He practiced the strictest asceticism while still living at home, and on his mother's death, about 375, he retired to the desert around Antioch. After six years the ascetic severity of his life and studies brought on an illness which forced him to return to Antioch, where he was ordained deacon by Bishop Meletius in 381 and presbyter by Bishop Flavianus in 386. The eloquence, earnestness, and practical tone of his preaching excited the attention of Jews, heathens, and heretics, and secured for him the reputation of the chief orator of the Eastern church. In 398 the eunuch Eutropius, minister of the Emperor Arcadius, who had been struck by the bold and brilliant preaching of Chrysostom, elevated him to the episcopate of Constantinople. Chrysostom immediately began to restrict the episcopal expenditure in which his predecessors had indulged and bestowed so large a portion of his revenues on hospitals and other charities that he gained the surname of "John the Almoner." He also endeavored to reform the lives of the clergy and sent missionaries into Scythia, Persia, Palestine, and other lands. His faithful discharge of his duties, especially in reproof of vices, excited the enmity of the Patriarch of Alexandria, of Theophilus, and of the Empress Eudoxia, who succeeded in deposing and banishing him from the capital (403). He was soon recalled, to be banished again shortly afterward (404). He was taken during July and August to Nicæa, now Isnik, in Asia Minor, the place where the famous Nicene Council was held, and there, to his great disappointment, he learned that his place of banishment was to be Cucusus, a little town in the Armenian highlands, now called Gozene. It was a weary journey, but he finally arrived there. The Bishop of Cucusus received him kindly, and the climate agreed with him. So his zeal was not abated. He labored for the conversion of the peoples in the neighborhood and wrote the 17 letters (or rather moral essays) to Olympias, to whom he also addressed a treatise on the proposition, "None can hurt the man who will not hurt himself." The Emperor, enraged by the general sympathy expressed towards Chrysostom by all true Christians, gave orders that he should be banished to the remote Pityus, on the northeast coast of the Black Sea at the foot of the Caucasus, a most desolate spot, involving a journey of hundreds of miles on foot. It was at the very verge of the Eastern Roman Empire. The march was begun and for three months kept up, but when he reached the chapel of the martyr Basiliscus, about 6 miles from Comana, in Pontus, he could go no farther and there died, Sept. 14, 407, blessing God with his dying lips. The news of his death excited much sorrow among all pious Christians, for Chrysostom was a man who drew the hearts of his fellows after him; a lovable, manly Christian, hating lies, worldliness, hypocrisy, and all manner of untruthfulness, with that honest warmth of temper which all vigorous people relish. A sect sprang up after his death, or martyrdom as they conceived it, called *Johannists*, who refused to acknowledge his successors; nor did they return to the general communion till 438, when the Archbishop Proclus prevailed on the Emperor Theodosius II to bring back the body of the saint to Constantinople, where it was solemnly interred, the Emperor himself publicly imploring the pardon of heaven for the crime of his parents, Arcadius and Eudoxia. The Greek church celebrates the festival of Chrysostom on November 13; the Roman, on January 27. In his *Homilies* (Thomas Aquinas said he would not give those on St. Matthew in exchange for the whole city of Paris) Chrysostom displayed superior powers of exegesis. In general, he rejects the allegorical system of interpretation and adheres to the grammatical, basing his doctrines and sentiments on a rational apprehension of the letter of Scripture. He is, however, far from being a bibliolater. He recognized the presence of a human element in the Bible as well as a divine; and instead of attempting, by forced and artificial hypotheses, to reconcile what he thought irreconcilable in Scripture statements, he frankly admitted the existence of contradictions and shaped his theory of inspiration accordingly. But his greatest and noblest excellence lay in that power, springing from the fervor and holiness of his heart, by which the consciences of the proud, the worldly, and the profligate were awakened, and all were made to feel the reality of the gospel message. The surname "Chrysostom" was first applied some time after his death, and, as it is supposed, by the Sixth Ecumenical Council in 680. Chrysostom's works are very numerous, and consist

of, 1st, *Homilies*, on parts of Scripture and points of doctrine; 2d, *Commentaries*, on the whole Bible (part of which have perished); 3d, *Epistles*, addressed to various people; 4th, *Treatises*, on different subjects (such as Providence, the Priesthood, etc.); and 5th, *Liturgies*. Of these the most valuable, as well as the most studied, are the *Homilies*, which are held to be superior to everything else of the kind in ancient Christian literature.

The best Greek edition of Chrysostom's works is that by Henry Savil (8 vols., Eton, 1613); and the most complete Greek and Latin edition is that by Montfaucon (13 vols., Paris, 1718–38; republished in 1834–40). There is an Eng. trans. in the first series of the *Nicene and Post-Nicene Fathers* (London and New York, 1889–90). For his biography, consult: Stephens (3d ed., London, 1883); Bush (London, 1885); Chase (London, 1887); Marshal (Paris, 1898).

CHRYS'OTILE. A fibrous variety of serpentine, which, owing to its susceptibility of division into fine threads, is used in the manufacture of fireproof fabrics.

CHRYS'OTYPE (from Gk. χρυσότυπος, *chrysotypos*, wrought of gold, from χρυσός, *chrysos*, gold + τύπος, *typos*, impression). A photographic process invented by Sir John Herschel, which depends on the reduction of a ferric salt to a ferrous salt by the action of light, and the subsequent precipitation of metallic gold on the ferrous salt. The process is now hardly ever used.

CHRZANOW, KZHÄ'NŎV. A town in the Austrian Crownland of Galicia, 27 miles west-northwest of Cracow, the centre of an important mineral region. Lead, zinc, coal, and cadmium are mined. There is considerable trade in agricultural products, and brandy and chicory are manufactured. Pop., 1900, 10,200, mostly Poles.

CHRZANOWSKI, KZHÄ-NÔF'SKĒ, WOJCIECH (1788–1861). A Polish general, who participated in Napoleon's Russian campaign and in the battles of Leipzig, Paris, and Waterloo. After Napoleon's final defeat he served in the national army of Poland, and was under Diebitsch in Turkey in 1828–29. In the Polish revolution of 1830 he served with distinction under the provisional government, rose to the rank of general of division, and in 1831 was made Governor of Warsaw. He was suspected of being friendly to the Russians and was for a long time under a sort of ostracism. In 1849 he was chosen by Charles Albert commander in chief of the Sardinian forces in his second war against Austria. Ramorino and Chrzanowski were charged with treachery, and the former was put to death. Chrzanowski lived for a number of years in Louisiana, but died in Paris. He published several works in Polish.

CHTHONIAN (thŏn'ĭ-*an*) **GODS.** In Greek mythology, the deities connected with the lower world, as HADES, PLUTO, PERSEPHONE, DEMETER, and HERMES.

CHUB (variant of *cub*). A fish (*Leuciscus cephalus*) of the family Cyprinidæ, bluish black on the upper parts, passing into silvery white beneath, with the cheeks and gill covers golden yellow. The chub is plentiful in many rivers of England and continental Europe, rarely reaches a weight of 5 pounds, spawns in April and May, and affords sport to anglers. In the United States the name is applied to several species of this family, most familiarly to the horned dace. (See DACE.) The river chub (*Hybopsis kentuckiensis*) measures 9 inches and is found on both sides of the Alleghanies. The chub of the Columbia River is *Mylochilus caurinus*, 12 inches long. See Plates of CARP AND ALLIES, and of DACE AND MINNOWS.

CHUBB, PERCIVAL (1860–). An American educator, born at Devonport, England. He was educated at the Stationers' School, London, and for 10 years was in the service of the Local Government Board. After removal to this country he was, in succession, lecturer on literature, Brooklyn Institute of Arts and Sciences; instructor in pedagogy, Pratt Institute; head of the English department of the Manual Training High School, Brooklyn; and principal of the high school department of the Ethical Culture School, New York. For a time he was also associate leader of the Society for Ethical Culture in New York, and in 1911 he became leader of the Society in St. Louis. He edited *Emerson's Selected Writings* (1888), *Dryden's Palamon and Arcite* (1899), *Select Writings of Lincoln* (1909), and wrote *The Teaching of English* (1902) and *Festivals and Plays in Schools and Elsewhere* (1912).

CHUB MACKEREL. A mackerel (*Scomber colias*), widely distributed throughout both oceans in temperate latitudes, and a food fish of some importance, though smaller than and inferior to the common mackerel. Its form is shown in the Plate of MACKERELS; the color is blue with about 30 wavy blackish streaks across the back. It is locally known by many names, as "linker," "easter," and "thimble-eyed" mackerel and in England as "Spanish" mackerel. It is extremely numerous in the Mediterranean Sea.

CHUB SUCKER. A small brown sucker (*Erimyzon sucetta*), called also "creekfish," numerous in lakes and quiet streams throughout the central United States and along the Atlantic coast. The sexual difference is strong, males in spring usually having three large tubercles on each side of the snout and the anal fin much swollen.

CHUBUT, chōō-bōōt'. A territory of Argentina, occupying the northern portion of Patagonia, and bounded by the Territory of Rio Negro on the north, the Atlantic on the east, the Territory of Santa Cruz on the south, and Chile on the west (Map: Argentine Republic, D 12). Its area is over 93,000 square miles. It is only slightly elevated in some parts, is traversed by the rivers Chubut and Senguer, and contains a number of lakes. Pop., 1905, 12,417. The chief settlement is Rawson, a colony of Welsh, near the east coast, with a population of about 500. Towards the close of 1907 petroleum was discovered at a depth of 1768 feet in the southern part of Chubut.

CHUCKWAL'LA. A large, stout-bodied iguanid lizard (*Sauromalus ater*) of the desert region of the southwestern United States. It is the largest lizard of the Colorado River plateaus, except the heloderma. "The broad body is black or blackish, and the large blunt tail is usually marked with white, or entirely white. It was generally found on lava or other dark rocks, with which its coloration harmonizes. It is a vegetarian, feeding entirely on the buds and flowers of plants, with the addition sometimes of a few leaves." It is much prized by the local Indians as an article of food, and when well cooked is liked by white men, its flesh resembling chicken. A name for it in southern California is "alderman lizard."

CHUCK-WILL'S-WIDOW (imitative of its cry). A large nightjar (*Antrostomus carolinensis*) of the southern United States, whose call note resembles its name, is articulated with great distinctness, and reiterated like that of its congener, the whippoorwill. It is a much larger bird than the whippoorwill, being a full foot in length, but has the same pattern of plumage. The mouth is enormous. The rictal bristles have prominent lateral branches, and both humming birds and sparrows have been found in the stomach, though insects are its usual food. It lays its two eggs on the ground, making no nest.

CHUFA (Sp.). A name applied to *Cyperus esculentus*, a perennial sedge that spreads extensively by its underground rootstocks. It bears numerous small tubers, on which account it is also often called "nut grass," or "ground almond." The tubers are edible and are eagerly sought after by hogs, which are frequently allowed to pasture upon them at will. Chufas grow well upon light, sandy soils, producing large crops. Upon land required for general farming they are liable to become a serious pest on account of the difficulty of their eradication. When dried or parched, the "nuts" have a fine flavor. They contain considerable amounts of oil, starch, and sugar, the proportions of which vary considerably. The oil is sometimes expressed and for culinary purposes is said to be unsurpassed. A similar species is *Cyperus rotundas*, to which the name "nut grass" more properly belongs. Both are met with in a wild state in many parts of the United States, especially in the South.

CH'Ü FOU. See KIUH FOW.

CHUFU. Another name for Cheops (q.v.).

CHUGACH FOREST RESERVE. See ALASKA.

CHU HI, chōō'hē' (1130–1200). The modern apostle of Confucianism in its philosophical form, whose writings are the recognized standard of orthodoxy and the creed of educated men in China. He has been officially approved by successive Imperial dynasties and even canonized. His father was a government officer and he was born in Fu-kien. Precocious from childhood, he took his second degree before he was 20 years old. He devoted his leisure time when in office to studying Buddhism and Taoism, but throwing these aside after a few years, he became an enthusiastic student of the writings of the schoolmen of the Sung dynasty (960–1126 A.D.). Confucianism, under the analysis and exposition of the scholars Chou Tun-i and the brothers Cheng, had received a new statement, emerging as something like a philosophical system, instead of the ancient simple ethics and ritual. Chu Hi, expanding and expounding the doctrines thus set forth a century before his day, won fame all over the Empire, and was summoned by the Emperor to the court for consultation in regard to things literary and political. He elucidated the doctrines of Confucius and Mencius, more especially with reference to the nature of man, the origin of good and evil, and the principles of creation. In 1180, as governor of a city in Kiang-si, he applied his principles and greatly improved public morals. His study room was the White Deer Grotto, on the hills near Lake Po-yang. Not content with philosophy, he summoned around him famous scholars, who were his pupils and worked over the great historical annals of Ssï-ma Kuang, and thus furnished the standard history of China; for Chu Hi's work, having been many times since reprinted with commentary and continuation, has been widely read in all Chinese Asia. Nearly all the histories and biographies (apart from annals) written since his time in China, Korea, Japan, etc., have been powerfully influenced by Chu Hi's model—i.e., on the plan of philosophy and edification, being less consecutive narratives of events than appraisals of men and their actions as righteous and unrighteous, according to Chu Hi's standards.

Chu Hi extended his labors in every direction of metaphysical speculation, and his commentaries on the ancient writings of the sages have held the intellect of learned men of China and surrounding countries almost without challenge or criticism, until about the beginning of the second half of the seventeenth century, when they began to be vigorously assailed in China and later in Korea and Japan. In Japan Chu Hi's system is called Tei-shu, which is the Japanese pronunciation of the names of the Cheng brothers and of Chu-(Hi). It was officially encouraged by Iyeyasu and his successors very much as a state church, and to oppose it openly was at first politically dangerous. Its most famous Japanese expounders were Kyuso, Seiga, and Arai Hakuseki, the opponents of this orthodox school and the critics of Chu Hi being Jinsai; Sorai, Togai, and others. The latter, forming the Kogahu school, was noted for its doubt of the truth of the teachings of Chu Hi. Chu Hi's philosophy in Japan, as well as in China, profoundly influenced the form and spirit of literature, both scholastic and popular; but in Japan the Chinese teachings, becoming amalgamated in a common cause with Shinto, served powerfully to stimulate the national sentiment and feeling which overthrew the Shogun and Yedo government and restored the Mikado to supreme power. Especially in the Province of Mito was this union of Chinese philosophy and Shinto teaching successfully carried out, powerfully influencing the minds of the gentry and scholars in bringing about the great revolution of 1868. Thus one of the strangest phenomena in history was witnessed in that the rule of the Tokugawa family (1604–1868) was first shaken and then overthrown by the very doctrine "which generations of able shoguns and their ministers had earnestly encouraged and protected."

In China Chu Hi's philosophy held its own until near the close of the Ming dynasty (1368–1644), when Chinese scholars began to feel that Chu Hi's system was too narrow to hold all the truth. As a result of the profound thinking stimulated by the Manchu conquest, a school of criticism and opposition arose whose demand was for a study of the ancient texts in their purity. By continuation and expansion of philosophical labor, and especially by coming into contact with Occidental science and speculation, modern reformers have become prominent, but their activity and aims have been much obscured to Western minds by the Boxer uprising (1900) and the necessary foreign invasion.

In brief, the system promulgated by Chu Hi is a body of thought which may be called the result of Chinese reflection during 1500 years, put into logical Chinese form indeed, but in reality an amalgamation of the three systems or religions of China. It is the ethics of Confucius transfused with the mystical elements of Taoism and the speculations of Buddhism, though very little acknowledgment is made to

any thought originating outside of the Confucian cycle. It is less rationalistic than pantheistic, for the cultivated Confucians believe in heaven as a bundle of laws and forces, or at least an orderly system of abstract principles and regulated energy, but with no clear expression of personality. Their voluminous discussions of Spirit, Way, Reason, Law, deal with what is formless and invisible. When a term for Creator is used, it is a rare word and found only in the vocabulary of scholars. There is no clear grasp of the idea of a personal Creator. Man is the highest expression of the forces of the universe, and even gods and devils fear his determined mind. The ultimate realities are force and law. Man has no immortal soul; he is highest in the scale of existence, yet he is only one in the endless series. The station, duty, or position in life is greater than the individual, and it determines him. Hence, in Japan, while loyalty (not filial piety, as in China) is the root of the system, the high sense of honor and willingness of self-effacement is the line of duty. Hence, also, in China the determination at all hazards to "save the face" of everything, and the making of form and ritual equal to substance and containing it. In Japan in the twentieth century Chu Hi's system is but a memory, or at most an evanescent shadow; in Korea it is powerful, yet rather as an adjunct to political economy; in China it still holds its own, but precariously, against the assaults of the modern radical reformers, of whom Kang Yu-wei, who in 1899 emerged into notice as adviser to the Emperor, is the most conspicuous example and best known in the Occident.

CHUKCHI, chōōk'chē'. See TCHUKTCHI.

CHU-KIANG, chōō'kyäng' (Chinese, pearl river), called also the CANTON RIVER. A river of south China, in the Province of Kwang-tung (Map: China, D 7). It is formed by the North and West rivers, which unite about 30 miles from Canton, which is situated at the head of its extensive delta. The estuary is very wide. The total length of the river is about 100 miles. The Si-kiang is connected with the delta of the Chu-kiang. See BOCA TIGRIS.

CHUKOR, chu-kōr', or **CHICKORE,** chĭ-kōr' (Hind. *cakōr*, Skt. *cakōra*, partridge). The Anglo-Indian name of the common red-legged hill partridge (*Caccabis chukor*), a favorite game bird in northern India and westward to the Black Sea. See PARTRIDGE.

CHULALONGKORN, chōō'lä-lŏng'kŏrn, SOMDETH PHRA PARAMINDA MAHA (1853–1910). A king of Siam. He was born in Bangkok, the son of King Paraminda Maha Mongkout, and was elected to succeed his father upon the latter's death in 1868. He assumed full royal powers in 1873. By introducing reforms and modernizing the government he became known as a progressive ruler: slavery was practically abolished during his reign, internal taxes reduced, canals and roads opened, postal telegraph and telephone services established, and lighthouses erected along the coast. One of his first reforms was to modify the ceremony which surrounded the approach to the King. He also established a new code of laws, improved the educational system, proclaimed religious freedom, and built hospitals and museums. At his request General Grant, while on his tour of the world, visited him for six days.

CHUMBUL, chŭm'bŭl, or **CHAMBAL,** chŭm'-bal (Skt. *Carmanvati*, having hides, from *carman*, hide). An unnavigable river of British India, rising in the Vindhya Mountains, which form the southern limit of the basin of the Ganges. Its source, at a height of 2019 feet above sea level, is in lat. 22° 26′ W. and long. 75° 45′ E. In its generally northwestern course of 514 miles it receives many tributaries on both sides, till, in lat. 26° 30′ N. and long. 79° 19′ E., it enters the Jumna from the right with such a volume of water that, when flooded, it has been known to raise the united stream 7 or 8 feet in 12 hours.

CHUN, kōōn, KARL (1852–1914). A German zoölogist, born in Höchst-am-Main. He studied the natural sciences in Göttingen and Leipzig from 1872 to 1875. In 1878 he became a privatdocent in Leipzig; in 1883 professor of zoölogy in Königsberg, then in Breslau in 1889, and in Leipzig in 1898. He has written: *Das Nervensystem und die Muskalatur der Rippenquallen* (1878); *Die Ktenophoren des Golfs von Neapel* (1880); "Cœlenterata," in Bronn's *Klassen und Ordnungen des Thierreichs* (1891 et seq.); and many less important works.

CHUNAM' (Tamil *cunnam*, Hind. *cānā*, lime, from Skt. *cūrṇa*, powder). A very fine kind of quicklime made from calcined shells or from very pure limestone, and used for chewing with betel (q.v.) and for plaster. It is very white and takes a high polish. Both fresh and fossil shells are used for making chunam. Extensive beds of fossil shells employed for this purpose occur in the south of India, particularly in low, marshy places near the seacoast. The chunam from Madras is among the best made. The shells used are in the first place very carefully cleaned; they are then calcined in kilns, with wood charcoal. When chunam is to be used for plaster, it is mixed with fine river sand and thoroughly beaten up with water. The name is applied also to a weight for gold used in northern India.

CHUNCHO, chōōn'chō, or CHONCHO. A group of savage and warlike tribes living in the forests at the extreme headwaters of the Ucayali River, central Peru. They have communal houses, cultivate corn, bananas, and pineapples, and range the forests for game. They bury their dead in their houses and are said to be afraid to be at any time in utter darkness for fear of evil spirits. On account of their ferocity, very little is definitely known of them. By some they are believed to be closely related to the Anti (q.v.), who are of Arawakan stock; but Rivet records Chonchos, of the region about Noyobamba, as belonging to his Cahuapana (i.e., Mainan) stock.

CHUNGA, chŭn'gà, or **CHUN'NIA** (Neo-Lat., from the native name). A cranelike bird (*Chunga burmeisteri*) of Argentina, closely related to the cariama (q.v.), but smaller, darker, and more addicted to wooded districts. It is shy, has a barking note, feeds largely upon locusts, and nests on the ground; but the young are easily and commonly domesticated.

CHUNG-KING, chōōn'king' (Chinese, middle city). A city of China, the commercial capital of the Province of Sze-chuan and one of the most important commercial centres of west China (Map: China, C 6). It is situated in lat. 29° 33′ N. and long. 107° 2′ E., on a small elevated peninsula at the confluence of the rivers Kia-ling and Yang-tze-kiang. It is surrounded by a strong stone wall, about 5 miles in circumference and pierced with nine gates. The climate is neither pleasant nor healthful. Chung-

king was opened to foreign trade in 1891 and has since become the centre from which the imports for west China are distributed through the affluents of the Yang-tze-kiang. Pop., 1910 (est.), 598,000.

CHU'PRA. See CHAPRA.

CHUQUET, shụ'kā', NICOLAS (c.1445–c.1500). A French mathematician. He was born in Paris and died in Lyons. His work, entitled *Le triparty en la science des nombres* (1484), has been copied many times, but was first printed in Boncompagni's *Bullettino di bibliografia e di storia delle scienze matematiche e fisiche* (Rome, 1880), from a manuscript in the Bibliothèque Nationale. The work consists of three parts: (1) treatment of rational numbers; (2) treatment of irrational numbers; (3) treatment of equations. Chuquet used the successive convergents of a continued fraction to approximate roots of numbers (the method used by Etienne de la Roche), and called it *ediocion entre le plus et le moins*. In the Triparty appear not only the signs $\bar{\mathrm{d}}$ and $\bar{\mathrm{m}}$ for plus and minus, but also expressions like

$$\mathrm{B}^4 \cdot 10, \mathrm{B}^2 \cdot 17 \text{ for } \sqrt[4]{10}, \sqrt{17}.$$

Chuquet used the Cartesian exponent notation $a_0, a^1, a^2 \ldots$ for $a, ax, ax^2 \ldots$; $a^{\bar{\mathrm{m}}}$ for ax^{-1}; the expressions "equipolence" and "equipolent" for "equivalence" and "equivalent," and the words "byllion, tryllion, quadrillion, quyllion, sixillion, septyllion, ottyllion, nonyllion," as well as "million." Consult Boncompagni, *Bullettino XIII* (Rome, 1880), and Cantor, *Vorlesungen uber Geschichte der Mathematik*, vol. ii (Leipzig, 1900).

CHUQUISACA, chōō'kē-sä'kä, **CHARCAS,** chär'käs, or **SUCRÉ,** sōō-krā (So. Amer. Indian, place of gold). A department in the southeastern part of Bolivia, bounded by the Department of Santa Cruz on the north, Brazil on the east, Paraguay and the Department of Tarija on the south, and of Potosí and Oruro on the west (Map: Bolivia, E 8). Its area is 26,417 square miles. The western part is mountainous and has a good climate. The eastern part is mostly flat and very sparsely inhabited. The forests are extensive, and plenty of grazing as well as agricultural land is found. The chief mineral deposit is silver, which is mined to some extent and exported. The civilized population was officially estimated in 1890 at 125,000, including 85,000 Indians and about 7500 whites; according to the census of 1900 it amounted to 204,434, including 8000 uncivilized Indians; in 1906 it was estimated at 228,966. Capital, Sucré (q.v.), which had formerly been the capital of the republic.

CHUR, kōōr (Fr. *Coire*, It. *Coira*, Lat. *Curia Rhætorum*). The capital of the Swiss Canton of Grisons, and an episcopal city, situated on the Plessur, 60 miles southeast of Zurich in the valley of the upper Rhine, in a fertile plain about 2000 feet above sea level, and surrounded by high mountains (Map: Switzerland, D 2). The town stands on uneven ground and has narrow streets. The bishop's palace and the quarter around it, inhabited by Roman Catholics, occupy the summit of an eminence and are separated from the rest of the town by walls and battlements, closed by double gates. In the same quarter stands the old cathedral, called the church of St. Lucius, a Romanesque edifice, founded in the eighth century and containing interesting paintings by Dürer and Holbein. The episcopal palace, in the Renaissance style, displays two old Roman towers and has rich archives and library. Behind it is the monastery of St. Lucius. In the lower city are the town hall, with fine painted windows, the Rhætian antiquarian museum, the cantonal library, and two theological seminaries. Chur was formerly an important trade centre on the road from Germany to Italy before the construction of the St. Gotthard Railroad. It flourishes still, owing to throngs of tourists, and to the traffic in wine, fruit, and agricultural products. Pop., 1905, 12,284; 1910, 14,485. The town was settled by the Romans, who named it Curia Rætorum, and from 451 it was an episcopal see. It was ruled by its bishops down to about the close of the Middle Ages. It entered the Confederation in 1498. Consult Planta, *History of the City of Chur in the Middle Ages* (Chur, 1879).

CHURCH (AS. *circe*, Ger. *Kirche*, from Gk. *κυριακόν, kyriakon*, church, from *κύριος, kyrios*, lord). The word has the same double meaning as its Græco-Latin equivalent, *ecclesia;* it signifies both the ecclesiastical body of believers and the building for worship.

Building. There were at first, among the Christians, no separate buildings for worship. The faithful met in the large room of a private house during the first and possibly the whole of the second century. The gatherings at the cemeteries to celebrate the anniversaries of the deaths of martyrs probably gave rise to the earliest special buildings for services, in chapels connected with the cemeteries outside the city walls, often built also at the entrance to the catacombs. The catacomb chapels were also used as churches. In the third century there were separate churches of considerable size. Then and during the two succeeding centuries there were two main classes of churches: cemeterial churches outside the walls, consecrated to martyrs; parish churches inside the walls, for more regular worship. Then came two further distinctions: (1) the episcopal church or cathedral, in which the bishop had his seat, among the parish churches; (2) the conventual church, attached to a monastery or nunnery, also called an abbey church. Rarely, and chiefly in England, an abbey church served also as a cathedral, the abbot being the bishop of the diocese. (See CATHEDRAL.) A subclass of the episcopal is the metropolitan church, that of the archbishop or patriarch of a diocese; still higher was the pontifical church—like the Lateran basilica. A subclass of the conventual church is a priory, belonging to a monastery governed only by a prior. A numerous class of churches is formed of the rural or country churches, in charge of the country curate. Palatine churches and chapels belong to Imperial, royal, or private palaces and castles.

The strict definition of a church is an ecclesiastical building for worship in which full service can be performed and the sacraments administered; in this it differs from oratories and chapels, where only prayers can be offered and the sacraments cannot be given, except occasionally, as on the patron saint's day. There was always a certain ceremony required for the consecrating and licensing of a church. The most famous early instance was that of the basilica at Tyre early in the reign of Constantine, when Eusebius pronounced his celebrated oration before a great assemblage of

bishops and the court and people. Mediæval chronicles are full of descriptions of the magnificent reunions and festivals on such occasions. Often the popes were present with the college of cardinals at the consecration of cathedrals or large monastic churches. In every case the bishops of the neighboring dioceses gathered. No church could be built and opened without being consecrated by the local bishop or his representative. No early written formulas of consecration have survived, but there are a number dating from the period between the tenth and the thirteenth centuries, which show the development of an elaborate symbolism. The consecration was often recorded in a special inscription, with the names of the attending bishops.

A church consists of two essential parts: the *nave*, for the congregation, and the *sanctuary*, for the clergy. As distinguished from pagan methods of worship, the mass of believers was gathered within, not kept outside the place of worship. In fact, the *agapæ*, which were the original form of the Christian gathering, had so slight a liturgy as not to call for separation of clergy and people. The third and fourth centuries, however, with the development of Church organization and liturgy, witnessed the enrichment of church architecture. The semicircle of the *apse* held the presbyters and bishop; and in front of it was placed the *altar;* beyond the altar the *choir* held the readers and singers, separated from the body of the church, or nave, by a parapet, which inclosed the pulpits or ambones. The nave itself was at first generally single, the men being placed in front and the women behind; but very soon the form of the basilica with its side aisles separated by columns was adopted, and the men were placed in one aisle, the women in the other, in order of rank and condition. In the Orient, however, the separation of the sexes, which was always considered necessary, was made even more effective by constructing galleries over the side aisles, in which the women were placed. The use of martyrs' relics, soon required by Church regulations in every church, led to the construction of a shrine to contain them in or beneath the altar. This shrine, called the *confession* (q.v.), developed, between the sixth and eighth centuries, into a monumental *crypt* (q.v.), sometimes filling the entire space beneath the church, but more often only that under the choir, whose pavement was thus raised above the level of the nave. This arrangement, almost universal in monastic and other Romanesque churches, went out of fashion in the Gothic cathedrals.

Churches are generally oriented, i.e., are placed so that the apse faces the east (*ex oriente lux*), while the façade faces west. But the earliest practice was the reverse, the apse facing west, and the priest officiating with face towards the altar and the congregation. This was a part of Christian symbolism which bears a curious analogy to Old Testament (Garden of Eden) and ancient Oriental ideas, especially sun worship. Over the door of the church was often an inscription such as "I am the Door," etc. The world was left outside. The wheel of fortune so often represented on the façade figured the vicissitudes of carnal life. Inside was the spiritual life. The church was consecrated to the people of God, "Plebs Dei"; its walls were covered with paintings or mosaics expressing all the themes of Christian history and belief necessary for the Christian people to know—the book of the unlearned. In the Orient, especially, but often also in the West, there was a strict order in the arrangement of sacred themes throughout the church, so that the people should be led gradually from the more elementary figurative subjects near the doors to the most fundamental and sacred ones in the sanctuary or apse, generally filled with the figure of the triumphant Christ and His attendant apostles and saints.

Speculation as to the origin of the form of the church is more or less idle. The connection with the already existing halls of the public and private basilicas is self-evident. The building was oblong, with a semicircular east end, on either side of which was a small room used to keep the treasures of the church and as a vestiary for the clergy. These sacristies were afterward thrown into the church as side apses. In some large early churches the form of a T was given to the plan by the addition of a cross arm between apse and nave. (See BASILICA.) The nave itself was flanked by one aisle on each side; sometimes by two aisles; sometimes also by lines of side chapels, though this was not done until the later Middle Ages. The façade, usually at the west end, sometimes took the outline of the nave and aisles, sometimes was a mere screen whose outline was not determined by the structure behind it: this was the case in Italy, but rarely in the West. Near it or connected with it was a bell tower, while, as the Middle Ages progressed, towers were multiplied, especially in northern and central Europe, and became an integral part of the architectural composition. It was in the Carolingian period, under monastic influence, that the plan of churches was changed into the form of the cross (see ARCHITECTURE; GOTHIC ART; ROMANESQUE ART), thus bringing in the *transept*, and still later that the choir was so enlarged as almost and sometimes quite to rival the nave in size, as was the case in many Gothic cathedrals. Other forms, however, were sometimes in use: Concentric churches, either round or polygonal, such as San Stefano Rotondo in Rome, Nimeguen, Ottmarsheim, etc.; Greek crosses, as San Marco in Venice; single-nave churches, sometimes domed, as in Byzantine architecture, sometimes vaulted or roofed, as in Dominican and Franciscan churches, whose hall form was invented for the sake of the sermon.

Accessory Structures. There were many accessory structures connected with churches. The most usual were the *episcopal palace*, or the *parish house;* the *cloister* for the canons or monks attached to its service; the *chapels* dedicated to special saints and martyrs; the *baptistery*—in the case of churches where baptism was allowed; the *atria* or cloistered courts in front or beside the main building. The cathedral of Parenzo shows a typical grouping. In front, the episcopal residence; then the baptistery, on the axis of the church; then the rectangular atrium surrounded by colonnades; then the church itself. This was the type from the fourth to the ninth century. The cathedrals of the twelfth and thirteenth centuries show the perfecting of quite a different plan; all the structures in front of the church have disappeared, and it fronts directly on the city street or square. This scheme has ever since been retained, except in monastic churches, which were within the conventual walls. These monastic

and conventual churches were often of great size and formed the dominant element of a group of imposing extent and often of great splendor (see MONASTERIES), with their cloisters, dormitories, refectories, hospitals, storehouses, and chapels.

Church furniture and decoration were always a very important feature. A church was not regarded as completed in the Middle Ages unless it was covered with instructive sculptures or paintings, through which it carried out a large part of its mission. These decorations were not left to the artist, but planned by the ecclesiastical authorities. (See ICONOGRAPHY.) Mosaics, frescoes, tapestries, and painted-glass windows within, sculptured reliefs and statuary without, were used in profusion even in the times when art had fallen lowest. Thrones for bishop and priests, choir stalls for the singers, altars and altarpieces, pulpits, tombs, hanging lamps, and tapestries—all gave ample opportunity for rich display of color and form. St. Bernard's anger was excited by the very profusion of this ecclesiastical art; and he carried on a crusade for simplicity, which was successful only within his own order of Cistercian monks. A second reaction against church magnificence came with Protestantism, which destroyed so many churches, and in building its own often showed the most rigid simplicity, to the great loss of art. But with the growth of Protestantism has come progress in church building. Wren's cathedral of St. Paul in London and his many parish churches were early examples: the types he devised were followed in a measure in American Colonial and early Republican churches. Since the Gothic revival of the last century many beautiful parish churches have been built in that style, both in Europe and America, though few of great size, because the emphasis on preaching in most Protestant bodies necessarily limits the size of the building. Modern churches are built in various styles, both mediæval and neoclassic. Among modern examples may be mentioned Brompton Oratory and Westminster Cathedral, both Roman Catholic, in London; Sacré-Cœur de Montmartre (Roman Catholic), at Paris; cathedral at Berlin; Trinity Church, New York; Trinity Church, Boston; St. Patrick's Roman Catholic Cathedral, New York; All Saints, Albany; St. John the Divine (Episcopal Cathedral) and St. Thomas, New York.

Bibliography. Up to the time of the Renaissance the history of architecture is the development of the church building. The most complete work covering the whole ground is Dehio and Von Bezold, *Die christliche Baukunst des Abendlandes* (Stuttgart, 1887–1901; 5 vols. plates, 2 vols. text). See also Hübsch, *Altchristliche Kirchen* (Karlsruhe, 1862–63); Lübke, *Vorschule zur Geschichte der Kirchenbaukunst des Mittelalters* (Leipzig, 1873); C. E. Norton, *Church Building in the Middle Ages* (New York, 1880); Quast, *Entwickelung der Kirchenbaukunst des Mittelalters* (Berlin, 1858); Clausse, *Monuments du Christianism au moyen âge* (Paris, 1893); Hasak, *Einzelheiter des Kirchenbaues* (Stuttgart, 1903). For Germany, consult Schäfer, *Mustergiltige Kirchenbauten des Mittelalters in Deutschland* (Berlin, 1886); for France, Viollet-le-Duc, "De la construction des édifices religieux en France," in *Annales archéologiques*, i–iv (Paris, 1844–46); and "Architecture" and "Cathédrale" in his *Dictionnaire raisonné de l'architecture française*. For the lesser church buildings, see Braudot, *Eglises de bourgs et villages* (Paris, 1867); Brandon, *Parish Churches* (London, 1848). For Protestant church architecture, consult Schultze, *Das evangelische Kirchengebäude* (Leipzig, 1885), and especially *Der Kirchenbau des Protestantismus* (Berlin, 1893), published by the Vereinigung Berliner Architekten, and treating the entire period from the Reformation till the present date. For Colonial churches, Everett, *Historic Churches of America*.

CHURCH. An organization of Christians, generally defined by Western theologians in substantial accord with the Articles of the Church of England—"a congregation of faithful men, in which the pure word of God is preached, and the sacraments be duly administered in all those things that are of necessity requisite to the same." The Roman Catholic church emphasizes in addition the "rule of legitimate pastors," and especially subjection to the Bishop of Rome as Vicar of Christ. Under these general definitions a great variety of forms of outward organization are recognized. The *papal* government makes all authority finally dependent upon the Pope, who is the Bishop of Rome. The *episcopal* government is administered by bishops, who are all essentially equal in honor and authority, although there may be archbishops who have a certain priority and jurisdiction over other bishops in definite particulars. (See BISHOP.) The *presbyterian* government puts authority in the hands of elders, ministerial and lay, elected ultimately by the congregation. (See PRESBYTERIANISM.) The *congregational* government puts the entire authority over each local congregation of believers in that congregation alone. (See CONGREGATIONALISM.) All Protestants understand by the true Catholic Church (invisible) the whole number of the truly regenerated. Various theories are held as to the manner in which the life of the Church is perpetuated—that maintained by the great majority of Christians, the members of the Roman Catholic, Eastern, and Anglican churches, being known as the theory of apostolic succession (q.v.), while the Protestant churches in general, agreeably to the definition quoted above, postulate no formal system of handing down the Church from age to age. For the discipline of the Church, see DISCIPLINE, ECCLESIASTICAL. See also CREEDS AND CONFESSIONS; SACRAMENT; WORSHIP; CIVIL CHURCH LAW.

CHURCH, A(LEXANDER) HAMILTON. An English efficiency engineer. He became known as one of the pioneers in reducing the commercial organization of factories to the basis of a science, a work in which he was early associated with J. Slater Lewis. His writings include *Production Factors in Cost Accounting and Works Management* (1910), and *The Proper Distribution of Expense Burden* (1908; 2d ed., 1913), both of which had previously appeared as series of articles in the *Engineering Magazine*. He also published a series of papers entitled "Practical Principles of Rational Management" in the same periodical in 1913.

CHURCH, ALFRED JOHN (1829–1912). A prolific English author and scholar, born in London. He was educated at King's College, London, and at Lincoln College, Oxford; ordained (1853); assistant master of Merchant Taylors' School, London (1857–70); head master of Henley Grammar School (1870–72) and

of Retford Grammar School (1873–80); professor of Latin in University College, London (1880–88); rector of Ashley, Tetbury, Gloucestershire (1892–97). He has done much to diffuse a knowledge of ancient culture and is best known for his retellings of classical tales and legends for young people, many of which are published both in England and America. Among his works are a translation of Tacitus, in conjunction with W. J. Brodribb (1862–77); stories from Homer, Vergil, Livy, the Greek tragedians, and Herodotus; *Roman Life in the Days of Cicero* (1883); *Two Thousand Years Ago* (1885); *To the Lions*, a tale of the early Church; *Carthage* (1886); *Pictures of Roman Life and Story* (1892); and the following between the last-named date and 1913: *Early Britain; Heroes of Chivalry; Helmet and Spear; Memories of Men and Books* (1908). Church also edited a collection of translations from Tennyson into Latin verse, under the title *Horæ Tennysonianæ* (1868).

CHURCH, Sir Arthur Herbert (1834–1914). An English chemist, born in London. He received his education at King's College, London, the Royal College of Chemistry, and Lincoln College, Oxford. In 1863 he was appointed professor of chemistry in the Royal College of Agriculture, Cirencester, and from 1879 to 1911 he held the corresponding chair in the Royal Academy of Arts. He lectured at Cooper's Hill from 1888 to 1900, and presided over the Mineralogical Society from 1898 to 1901. He was created K.C.V.O. in 1909. Besides several new minerals, including *churchite*, he discovered the animal pigment *turacin;* and he also carried out a number of interesting researches in organic, inorganic, physiological, and industrial chemistry. His published works include: *Precious Stones* (1883; 5th ed., 1905); *English Earthenware* (1884; 6th ed., 1911); *English Porcelain* (1886); *Food Grains of India* (1886); *Color* (2d ed., 1887); *The Laboratory Guide* (1894; 8th ed., 1906); *Food* (1901); *Chemistry of Paints and Painting* (3d ed., 1901); *Josiah Wedgwood* (2d ed., 1902); *Classified Papers and Letters and Papers in Royal Society Archives* (1907–08); *Guide to Corinium Museum* (10th ed., 1910).

CHURCH, Benjamin (1639–1718). An early New England soldier, famous as an Indian fighter. He was born in Duxbury, Mass., founded the town of Little Compton, Mass., in 1674, and took an active part in the war against King Philip, who was finally defeated and killed by a force under Church in 1676. In 1689 he commanded a futile expedition against the Indians in the Kennebec region, and in the following year was again sent into Maine, where he captured several Indian forts along the Androscoggin. In 1704 he commanded a force of about 700, which, in retaliation for the French and Indian attack upon Deerfield, destroyed Grand Pré and Beaubassin in Acadia. From memoranda kept by him, his son, Thomas Church, published in 1716 a book entitled *Entertaining Passages Relating to Philip's War—as also of Expeditions more lately made against the Common Enemy and Indian Rebels in the Eastern Parts of New England*—"a soldier's bluff narrative of his own dangerous and enticing adventures," which was widely read during the Colonial period, appeared in numerous editions, and was reprinted in Boston under the editorship of H. M. Dexter in 1865–67.

CHURCH, Frederick Edwin (1826–1900). An American landscape painter, of the so-called Hudson River school (q.v.). He was born in Hartford, Conn., May 4, 1826, and was a pupil of Thomas Cole, with whom he worked until the latter's death. He first derived prominence by his "View of East Rock, near New Haven," and "Scenes in the Catskill Mountains." He traveled extensively in South America (1853 and 1857), Labrador (1863), Ecuador, New Granada (1866), the Holy Land and Europe (1868). The subjects of his paintings were largely taken from sketches of these different countries. Church had a fine pictorial sense and good feeling for correct composition, and in spite of his minute execution and infinite detail, the effect of these large panoramas is often impressive and nearly always interesting. He conceived the proper subject of landscape painting to be the most striking and wonderful scenes of nature, and thus his work depended largely on scenic interest for its popularity. During his own day his reputation was very great both in the United States and Europe. Good examples of his work are "The Ægean Sea" (Metropolitan Museum, New York), "Cayambe, South America" (Public Library, New York), "Landscape, South America" (Academy of Design Gallery, New York), "Chimborasso" (1876), "Weltausstellung" (Philadelphia), "Eise Berge" (London). Others are "The Parthenon," "Heart of the Andes," "Cotopaxi," "Horse-Shoe Fall, Niagara," "Damascus," "Jerusalem." Consult Isham, *American Painting* (New York, 1905).

CHURCH, Frederick Stuart (1842–). An American animal and figure painter, illustrator, and etcher. He was born in Grand Rapids, Mich., and studied with Shirlaw in Chicago and Wilmarth in New York. He is a member of the National Academy and American Water-Color Society. Among his pictures are "Weirdness," "Mad as March Hares," and "The Sea Princess," in oil; and "Hard Times" and "The Phantoms," in water colors. He exhibited "St. Cecilia" in 1896. He also exhibited, in the National Academy of Design, 1901, "The Sea Serpent," "Companions" (1909), "The Were Wolf" (1910), "St. Cecilia" and "Summer" (1911), "The Stowaway" and "Refuge" (1912), "Conquered" (1913). Church has a sensitive and delicate feeling for color which he realizes more fully through his use of water color than in the medium of oil. His conceits partake somewhat of the German order of fancy and are quaint, sometimes humorous, and sometimes philosophic. His sense of composition and line is graceful and decorative.

CHURCH, Sir Richard (1784–1873). A British soldier, born in Cork, the son of a Quaker. He served for many years in the British army and in 1809 and 1812 raised two regiments of Greek light infantry, in vain attempts to free the Peloponnesus. In 1817 he entered the Neapolitan army. In 1827 he was chosen generalissimo of the land forces of the Greek patriot army. Thereafter he lived in Athens. He wrote *Observations on an Eligible Line of Frontier for Greece* (1830). Consult Poole's biography (London, 1890) and E. M. Church, *Sir Richard Church in Italy and Greece* (Edinburgh, 1905).

CHURCH, Richard William (1815–90). An English author and ecclesiastic, nephew of the preceding. He was born in Lisbon, studied in Oxford, was appointed a fellow of Oriel in

1838, was a friend of the more prominent Oxford Tractarians, started the *Guardian* in 1846, became a rector near Frome in 1852, and was dean of St. Paul's from 1871 until his death. Dean Church was a liberal High-Churchman. He was a scholar with a masterly style and wrote: *Essays and Reviews* (1854); *Civilization and Religion* (1860); *University Sermons* (1868); *The Beginning of the Middle Ages* (1877); able volumes on *Bacon* (1879) and *Spenser* (1879), in the "English Men of Letters Series"; a posthumous work on *The Oxford Movement* (1891); and *Occasional Papers* (1897). Consult his daughter's memoir (1895) and a biography by Lathburg (1907).

CHURCH, WILLIAM CONANT (1836–). An American editor, born at Rochester, N. Y. He was educated in the Boston Latin School. While still a youth he engaged with his father in editing and publishing the New York *Chronicle*. In 1860 he became publisher of the New York *Sun* and in 1861–62 was Washington correspondent of the New York *Times*. He resigned this position on his appointment as captain in the United States Volunteers in 1862. He served for one year, receiving brevets of major and lieutenant colonel. In 1863, with his brother, he established the *Army and Navy Journal* and in 1806 founded the *Galaxy Magazine*. He was government commissioner to inspect the Northern Pacific Railroad in 1882. With George W. Wingate he established the National Rifle Association and was its first president; he was one of the founders of the Metropolitan Museum of Art, an original member of the Military Order of the Loyal Legion, and became a life member and director of the New York Zoological Society.

CHURCH ALE. An annual festival, held in England in a churchyard or near a church, at which much ale was used. It is said by some to have celebrated some anniversary, as the dedication of a church, or Easter or Whitsuntide. The profits were used for church repairs. Church ales are now represented by village fairs, wakes, etc.

CHURCH ASSOCIATION FOR THE ADVANCEMENT OF THE INTERESTS OF LABOR, THE. An organization founded in 1887, in New York City, by communicants of the Protestant Episcopal church. Its object is to interest the clergy and the laity of the church in problems of the laboring man and to show sympathy with laboring classes in their struggle for justice. Bishop Huntington was the first president, and over 60 bishops are honorary members. Communicants of the church are eligible for membership and others for honorary membership. There are standing committees on strikes, sweatshops, etc. The organ of the association is the *Hammer and Pen*.

CHURCH CALENDAR. A table of holy days, saints' days, church festivals, and the like. The earliest now existing, which contains the Christian festivals, is that of Silvius, 448 A.D. A fragment of a Gothic calendar remains, which probably belongs to the fourth century. The name is applied also to the *fasti*, or catalogues for particular churches, of the saints most honored by them, such as bishops, martyrs, etc. At the Reformation the German Lutheran church retained the Roman calendar. The full calendar of the Church of England contains nine columns, giving the golden number, days of the month, the dominical or Sunday letter, the calends, nones, and ides, the daily Scripture lessons, and the holy days of the Church, together with some of the Roman festivals which have been retained, not as having any religious value, but because the practice of the courts or popular customs had become interwoven with them. The calendar of the Protestant Episcopal church in the United States retains only the festivals which are referable to a scriptural origin.

CHURCH CONGRESS. The name of free gatherings of ministers and laymen of the Established church of England, annually convened for the discussion of ecclesiastical and religious questions. The first church congress was held in 1861 in Cambridge and in the following years successively in Oxford, Manchester, Bristol, York, etc. The attendance is usually very large and comprises many bishops and lower dignitaries. Full reports of the proceedings of each session are published. Such meetings, having the advantage of free interchange of views, but with no claim to ecclesiastical authority, have been found very profitable; and in the Protestant Episcopal church of the United States they have been held since 1875 in the years when the General Convention does not meet.

CHURCH DIET. The free gathering of ministers and lay members of German Protestant churches. Such meetings arose in consequence of the revolutionary movement of 1848, which threatened to endanger the influence of the Evangelical church upon society. Members of the Lutheran, Reformed, the United Evangelical, with the High Church "confessionals," participated in the earlier meetings; but after 1860 only the evangelical parties were represented. Annual reports are published.

CHURCH DISCIPLINE. The means employed by the Christian Church, besides the ministration of word and sacraments, to secure on the part of its office bearers and members a faithful adherence to their profession and a corresponding blamelessness of life. It rests upon the authority of Christ and at the same time necessarily arises in some form out of the very constitution of the Church as a society. Among the early Christians it soon assumed forms of great severity towards offenders, especially towards the *lapsed* (q.v.). At a later period the discipline of the Church was chiefly exercised with respect to persons accused of heresy and schism. The penances of the Church of Rome have long formed an important part of its discipline, and therewith its *indulgences* are closely connected, as well as its doctrine and rule of *auricular confession*. (See CONFESSION.) In the Protestant churches public confession of sins by which public scandal has been given, and submission to public rebuke, are sometimes required. Practices more analogous to those of the primitive Church were established in many churches after the Reformation, but in general have fallen greatly or entirely into disuse. The power of exclusion from the Lord's Supper, and from the rights and privileges of church membership, is, however, generally retained and exercised, until, by profession of repentance and by reformation of life, the cause of such exclusion is removed; and ministers or other office bearers are, upon offense given in their doctrine or conduct, suspended from their functions or altogether deposed from their office. The exercise of church discipline belongs more or less exclusively to a hierarchy,

or to the office bearers assembled in church courts, or to the members of each congregation, according as the church is Episcopalian, Presbyterian, or independent in its church government.

Legality of Church Discipline. In the United States church discipline is administered exclusively by church officials and judicatories. The complete separation of church and state deprives the civil tribunals of all power to revise or question ordinary acts of church discipline, or of exclusion from church membership. Secular tribunals have to do only with the rights of property and of personal liberty. If these are illegally invaded, under pretext of administering church discipline, the civil courts have authority to afford redress. See CIVIL CHURCH LAW.

Whether a church member is amenable to ecclesiastical punishment is to be determined by the proper officers or judicatories of the particular church, in accordance with its rules of government and discipline. From their final decision no appeal lies to a civil court. In the language of the United States Supreme Court: "The law knows no heresy and is committed to the support of no dogma, the establishment of no sect. The right to organize voluntary religious associations to assist in the expression and dissemination of any religious doctrine, and to create tribunals for the decision of controverted questions of faith within the association, and for the ecclesiastical government of individuals, congregations, and officers within the general association is unquestioned. All who unite themselves to such a body do so with an implied consent to this government and are bound to submit to it." The disciplinary authority of such bodies, and the rights and duties of their members, are governed by the same general rules of law that control in case of social or political clubs or other private organizations. See RELIGIOUS SOCIETIES; and cf. CANON LAW and CLUB.

CHURCHES OF ASIA, THE SEVEN. The churches addressed in the opening chapters of the Book of Revelation, under the following names: Ephesus, Smyrna, Pergamum, Thyatira, Sardis, Philadelphia, and Laodicea. These churches represented groups into which the churches of the Province of Asia had come to be organized before the Book of Revelation was written. These groups were not so much of territorial character, marked off by geographical limits, as postal districts, having respectively, as their distributing centres, one of these seven cities lying on the main route which forms an inner circle around the most important part of the province. Ephesus would be the distributing point for the Cayster and lower Mænander valleys and the coast; Smyrna for the lower Hermus valley and the North Ionian coast; Pergamum for the north; Thyatira for the inland district to the northeast and east; Sardis for the middle valley of the Hermus; Philadelphia for upper Lydia; Laodicea for the Lycus valley and for central Phrygia—the whole of the province being thus compassed through supplementary messengers who would proceed from these distributing cities through the secondary districts which they represented.

From the qualities assigned these churches in the above chapters, Smyrna, in spite of her poverty, possessed the most commendable spiritual life, being designated in its message as "rich" (ii. 9). This was perhaps due to its continued exposure to persecution, which later (c.155) resulted in the martyrdom of its bishop, Polycarp, at the instigation of the hostile Jews of the city. In its Byzantine period its bishopric was originally subject to Ephesus, though it afterward became independent and was finally raised to metropolitan rank. Its endurance remained a characteristic of its life, though it was largely its strategic position, as well as its commercial relations with the West, which made it the last Christian city in Asia Minor to yield to Turkish rule (1402). On the other hand, in spite of its great wealth, Laodicea possessed the least commendable spiritual life and is spoken of as in the unendurable condition of lukewarmness (iii. 16). Little is known of its later Christian life beyond the fact that it seems to have been beset with a spirit of compromise. In the ecclesiastical organization the city came to be the leading bishopric of Phrygia.

Of the remaining churches, Philadelphia is commended in terms similar to those addressed to Smyrna, though betraying, along with its fidelity, a lack of strength in its religious living, doubtless due to the smallness of the church's numbers (iii. 8). It rose to the first place among the bishopries of Lydia, and with an endurance almost equal to that of Smyrna, resisted until the very close of the fourteenth century (c.1390) the Turkish conquest. Sardis, on the other hand, is rebuked almost as severely as Laodicea (iii. 1), though a reservation is made of a few names in the church which are worthy (verse 4). At the time these letters were written, it was a city whose greatness belonged to a barbarous civilization that had passed away. In the organization of the churches, however, its bishopric was of metropolitan rank within the Province of Lydia, though it finally yielded its primacy to Philadelphia (1316 A.D.).

With the life of the churches of Pergamum and Thyatira fault is found chiefly because of failure to separate the religious life clearly and distinctly from the life of the irreligious world; the blame of Ephesus is that it had lost its first enthusiasm. Ephesus continued for centuries the first ecclesiastical centre of western Asia, being the place of the Council of Ephesus (431 A.D.). And though at the time of these letters its importance was shared with Pergamum, which was the historical and still remained the official capital, and at the first was the sole metropolis of Asia, yet in these letters it stands as representing the whole province, as the province represents the whole Church. Of the later history of the churches of Pergamum and Thyatira little or nothing is known. Pergamum, however, became a bishopric and so continued through the Byzantine period.

Bibliography. Ramsay, *The Letters to the Seven Churches* (1905); *Cities and Bishopries of Phrygia*, vol. i (1895); Von Dobschütz, *Christian Life in the Primitive Church*, pp. 255 ff. (1904).

CHURCH GOVERNMENT. See CHURCH; CHURCH DISCIPLINE; BISHOP; INDEPENDENTS; PRESBYTERIANISM.

CHURCH HISTORY. The history of the Christian religion and Church. With much diversity on minor points, there is a general agreement in dividing the history of the Church into three great periods: the first, from the birth of Christ to the time of Constantine; the second, from that epoch to the Reformation; and the third, from the Reformation to the present day. The earliest facts of Church history

are to be learned only from the New Testament and from the brief hints in the letters and other writings of the primitive fathers. Hegesippus, a Jewish Christian of the latter half of the second century, put together some memorials of these early times; but his work has survived only in a few quotations. The real father of ecclesiastical history is Eusebius of Cæsarea (died c.350). His work was continued to the fifth century by three important historians—Socrates, Sozomen, and Theodoret. In the West attempts were made to translate, combine, and complete these Eastern histories by Rufinus, Sulpicius Severus, and Cassiodorus. In the sixth century Theodorus Lector, Zacharias, and Evagrius were of some importance. But the stagnation which came over Eastern theology was felt in the historical department, and only one Greek author is worthy of mention throughout the whole of the Middle Ages—Nicephorus Callistius, a priest of Constantinople who wrote in the early fourteenth century, and who drew his materials from the library of the church of St. Sophia, of which he had charge. In western Europe, on the other hand, the stirring religious life which found expression in so much development of doctrine and discipline also led to the careful recording of important events. The product of this literary activity falls into three main classes—histories of separate peoples; attempts at universal histories; and the mass of annals, chronicles, and bibliographies. The most prominent names in the first class are: Isidore of Seville, for the Goths and Vandals; Gregory of Tours, for the Franks; Bede, for the Anglo-Saxons; and Paulus Diaconus for the Lombards. The earliest mediæval attempt at a general Church history was made by Haymo of Halberstadt (died 853); another followed in 872, by Anastasius, the librarian of the Roman church. Ordericus Vitalis produced a notable work about 1412. But the greatest general history written in the Middle Ages was that of the Dominican Antoninus, Archbishop of Florence from 1446 to 1459. In places, especially in his account of the donation of Constantine, he shows an awakening of the critical spirit which was fostered by Laurentius Valla and Nicolas of Cusa. The third class is far too large to treat in detail. A *catalogue raisonné* of it may be found in Potthast, *Bibliotheca Historiæ Medii Ævi* (Berlin, 1862), or in Chevalier, *Répertoire des sources historiques du moyen âge, Bio-bibliographie* (Paris, 1886).

A new era began for ecclesiastical history about the end of the fifteenth century. The critical tendency aroused by the revival of letters, the bringing to the West of early Greek texts, the rendering of sources accessible by the invention of printing, and the controversial spirit of the Reformation, which forced both sides to attempt to justify their position by history—all these made great changes in the method. About the middle of the sixteenth century the Magdeburg Centuriators (q.v.) undertook their great work with a view of proving the utter iniquity of all that had ever been done by the papacy, which to them was Antichrist, and though they had unusual scholarship and knowledge of sources, their polemical bias detracted much from the value of their work. It called forth a counterblast from the Catholic side in the *Annals* of the Oratorian Baronius, who had access to an immense number of valuable documents. He produced a work far in advance of any previous attempt, and accepted so generally that a century passed before any other work of the same scope was undertaken. The next important works from the Roman Catholic standpoint came from France, as part of the general efflorescence of the reign of Louis XIV. The names of Godeau (died 1672), Maimbourg (died 1686), Fleury (died 1724), and still more Natalis Alexander (died 1724) and De Tillemont (died 1698), deserve to be remembered. Of modern French Roman Catholic works, the best are Rohrbacher (died 1856), Darras, and Guettée. Italy does not supply many names of excellence in the general field; the most notable are Orsi (died 1761), De Graveson (died 1733), and Berti (died 1766). The Italians distinguished themselves more in special studies, particularly Mansi, Muratori, De Rossi, Moroni, and Tiraboschi. In Germany there has been since the Reformation a continuous tradition of apologists for that movement and its principles. Special histories of it were composed by Sleidan and Seckendorf. In the seventeenth century Calixtus distinguished himself in this department, and, after him, Illig, Rechenberg, and Thomasius. In the general field, from the Lutheran point of view, are the mystic Arnold (died 1714), Mosheim (died 1755), and his pupil, Schröckh (died 1808); Semler (died 1799), who led the way to a more rationalistic treatment; and Planck (died 1833). In modern times the first great name is Neander (died 1850). F. C. Baur, who followed out the impulse of Semler, has had much influence, and his work was continued by his son, F. Baur, and his son-in-law, Zeller. Hase (died 1890) holds a middle ground between Baur and the more orthodox; and later still in time come Harnack, Hauck, and Loofs. Other historians in the Reformed churches have been largely specialists, such as Pearson, Dallæus, Dodwell, Beveridge, Bingham, Ussher, Cave, and Blondel. The Church of England, to which some of these names belong, and which produced in the middle of the nineteenth century Milman's *History of Latin Christianity* and the work of Robertson, has later been adorned by the learning of Stubbs and Creighton. A succession of learned German writers in the Roman Catholic church dates from Count von Stolberg (died 1819), whose work was continued by Von Kerz, Brischar, and Katerkamp. Others of this school are Hortig (died 1847), Ritter (died 1857), Alzog (died 1878), Hefele (died 1893), Cardinal Hergenröther (died 1890), and Pastor. In America Church history has not been much cultivated, but the best general historian is Philip Schaff. Others who have done good service are G. P. Fisher, J. H. Hurst, and H. C. Sheldon. The modern tendency everywhere, as in other branches of learning, is towards specialization rather than an attempt to cover the entire field; and a multitude of works bearing on the history of particular churches and periods will be found referred to in the bibliography of the articles on those subjects. For bibliography of a more extended nature, consult: Hagenbach, *Encyklopädie und Methodologie der theologischen Wissenschaften* (12th ed. by Reischle, Leipzig, 1889); Crooks and Hurst, *Theological Encyclopædia* (New York, 1884), which is based upon Hagenbach; and, for the names of Roman Catholic works, Hurter, *Nomenclator Literarius* (5 vols., Innsbruck, 1871–86). A review of the development of Church history may be found in

the introduction of vol. i, Schaff, *History of the Christian Church* (5th ed., New York, 1890).

CHURCHILL, CHARLES (1731–64). An English poet, born in Westminster, where his father became a curate. He was educated at Westminster School and two years later, at 17, made a clandestine marriage. In 1756 he was ordained and soon afterward succeeded his father as curate of St. John's, Westminster. In 1761 he published anonymously (at his own risk, the booksellers having offered him only five guineas for it) *The Rosciad*, a satire on theatrical managers and performers. Its success was instant, and he avowed himself the author. Later in the same year he brought out *The Apology*, a bitter attack on his critics, which added alike to his purse and to his notoriety. He now totally neglected the duties of his office and led a most dissolute life. His parishioners were scandalized, and his dean remonstrated; whereupon, to show his utter contempt for the ministerial profession, Churchill appeared in a blue coat, gold-laced hat and waistcoat, and large ruffles. He was obliged, however, to resign his preferment. A friend of John Wilkes (q.v.), he contributed to the *North Briton*. Among his other poems, all more or less satirical, are: "Night"; "The Prophecy of Famine: A Scot's Pastoral"; the "Epistle to Hogarth"; "The Author"; "The Candidate"; "The Ghost"; "Gotham"; and "The Duelist." He died Nov. 4, 1764, while on a visit to Wilkes in Boulogne. Consult *Genuine Memoirs of Charles Churchill* (London, 1765), and the Aldine edition (London, 1892) of his works, containing notes by Tooke, and a memoir by Hannay.

CHURCHILL, JOHN. See MARLBOROUGH, JOHN CHURCHILL, DUKE OF.

CHURCHILL, LORD RANDOLPH HENRY SPENCER, usually called LORD RANDOLPH CHURCHILL (1849–95). An English Conservative statesman. The third son of the seventh Duke of Marlborough, he was born at Blenheim Palace, Feb. 13, 1849. He was educated at Eton, and Merton College, Oxford, and entered Parliament in 1874 as member for Woodstock. The same year he married the brilliant Miss Jennie Jerome of New York, who, as a prominent member of the Primrose League, gave him valuable assistance throughout his political career. He was a quiescent member until 1880, when the Conservative defeat roused him to action as the leader of the Fourth party—a small band of keen-minded Conservatives. He distinguished himself as a ready, unconventional debater, attracting particular attention by his audacious criticism of Gladstone's foreign and domestic policy. At the same time he was so fearless a critic of various Conservative leaders that his group gained the nickname of the "Fourth party." He became still more prominent as chairman of the Conservative Union (1884) and in 1885 unsuccessfully attempted to defeat Mr. Bright in Birmingham, but was returned for South Paddington, which was kept in reserve for him. From June, 1885, to January, 1886, he was Secretary of State for India, his period of office being marked by the annexation of Burma. For six months in 1886 he was Chancellor of the Exchequer, but resigned, expressing the resolve "to sacrifice himself on the altar of thrift and economy." Thenceforward he incisively criticized governmental expenditure, although always voting with his party. He was the exponent of Tory democracy and had a considerable following of young Conservatives. "Congenital causes" suddenly occasioned a failing of power; and in 1892 he sought recuperation by travel and hunting in South Africa, sending interesting descriptions of his tour to the *Daily Graphic*, and publishing *Men, Mines, and Animals in South Africa* (1892). During his absence he was reëlected, but died in 1895. His *Life* (London and New York, 1906) was written by his son, Winston Spencer Churchill. Consult also Rosebery, *Lord Randolph Churchill* (London, 1906).

CHURCHILL, WILLIAM (1859–). An American Polynesian ethnologist and philologist, born in Brooklyn, N. Y. He was educated at Yale University. In 1896 he became Consul General to Samoa, where he also served as judge of the consular court, as senior member of the consular board under the Berlin General Act, and as adviser to Malietoa Laupepa, King of Samoa. He was also receiver and custodian of the Samoan revenues and president of the Municipality of Apia. In 1897 his commission was extended, making him also Consul General to Tonga. Later he became a member of the editorial staff of the New York *Sun*. He was elected a fellow of the Royal Anthropological Institute in 1912 and an honorary member of the Polynesian Society in 1913. He is author of *A Princess of Fiji* (1892); *The Polynesian Wanderings, Tracks of the Migration Deduced from an Examination of the Proto-Samoan Content of Efaté and Other Languages of Melanesia* (1910); *Beach-la-Mar, the Jargon or Trade Speech of the Western Pacific* (1911); *Eastern Island, Rapanui Speech and the Peopling of Southeast Polynesia* (1912); *The Subanu, Studies of a Sub-Visayan Mountain Folk of Mindanao* (1913), with Col. John Park Finley. He was also editor of the Malayo-Polynesian section of the *Standard Dictionary* (1913), and a contributor of articles to the second edition of the NEW INTERNATIONAL ENCYCLOPÆDIA (1914–15).

CHURCHILL, WINSTON (1871–). An American novelist. He was born in St. Louis, Mo., and graduated at the United States Naval Academy in 1894. He wrote *The Celebrity* (1898), a novel, but first became widely known through *Richard Carvel* (1899). This was followed by, notably, *The Crisis* (1901), *The Crossing* (1904), and *Coniston* (1906), all remarkably successful novels, and the last named considered by some his best effort. Later books of his are *Mr. Crewe's Career* (1908); *A Modern Chronicle* (1910); and *The Inside of the Cup* (1913). As an historical novelist and as a novelist of contemporary American life, Winston Churchill has done good and substantial work. He writes slowly and carefully, and the texture and structure of his novels are evidence of this commendable characteristic, which honorably distinguishes him from too many gifted and popular writers whose literary methods are more perfunctory. He made his home at Cornish, N. H., and in 1906 took an active part in that State's politics, practically forcing upon the Republican convention his programme for various reforms. See also AMERICAN LITERATURE.

CHURCHILL, RT. HON. WINSTON LEONARD SPENCER (1874–). Statesman and author, son of Lord Randolph Churchill. He was educated at Harrow and Sandhurst, entered the army in 1895, served with the Spanish army in Cuba, and fought with distinction in India (1897) and the Sudan (1898). On the out-

break of the Boer War (1899) he went to the Transvaal. On November 15 he was taken prisoner by the Boers while acting as correspondent for the *Morning Post*. He was imprisoned at Pretoria, but escaped later in the year. In September, 1900, he was elected Conservative member of Parliament for Oldham. He opposed Mr. Chamberlain's tariff reform proposals and in the sessions of 1904–05 acted with the Liberals. He became Parliamentary Secretary for the Colonies under the Campbell-Bannerman ministry in December, 1905, and in the general election of the following month was chosen as a Liberal from Manchester, Northwest. He then became Undersecretary of State for the Colonies, was promoted to the cabinet in 1908 as President of the Board of Trade, made Home Secretary in 1910, and First Lord of the Admiralty in 1911. An excellent orator, brilliant in repartee, fearless on the platform, Churchill, with the possible exception of Lloyd-George (q.v.), has become the foremost popular parliamentary speaker in the country. In his administrative work he has been tireless; as President of the Board of Trade he took an active part in the settlement of trade disputes; as First Lord of the Admiralty he has descended to the ocean bottom in submarines and has ascended in aëroplanes, holding, indeed, in person, an aviator's license. Although making tentative offers to Germany in 1913 for the declaration of a so-called "Naval Holiday," or an agreement for a year's respite from new armaments, Churchill has insisted on a consistently accelerated naval programme. He wrote: *The Story of the Malakand Field Force* (1898); *The River War* (1899); *Savrola* (1900); *London to Ladysmith via Pretoria* (1900); *Ian Hamilton's March* (1900); *Lord Randolph Churchill* (2 vols., London, 1906); *Free Trade in its Bearing on International Relations* (1908); *My African Journey* (1908); *Liberalism and the Social Problem* (1909).

CHURCHILL RIVER. A tributary of Hudson Bay from the west, its waters being discharged into Churchill harbor at Fort Churchill (Map: Northwest Territory, K 3). This river is in water connection with a large series of lakes in Keewatin, Athabasca, and Saskatchewan, and itself consists of a series of lakes and intervening narrower river channels. Through Reindeer or Caribou Lake the Churchill River appears to be in connection with Wollaston or Great Hatchet Lake, a portion of the water of which flows into the Mackenzie River. The general course of the Churchill River is at first east and then northeast; the distance from the source to the mouth is about 925 miles.

CHURCHING OF WOMEN. A religious usage prevailing in the Christian Church from an early period, of women, on their recovery after childbearing, going to church to give thanks. See Lev. xii. 6. In the Greek and Roman Catholic churches it is still frequent. In the Church of England, also, a service for the churching of women finds its place in the liturgy. It takes place after the fortieth day from parturition.

CHURCH OF ENGLAND. See ENGLAND, CHURCH OF.

CHURCH OF ENGLAND, FREE. See REFORMED EPISCOPAL CHURCH.

CHURCH or CHURCHES OF GOD. A religious denomination in the United States, sometimes called Winebrennerians, whose doctrines agree generally with those of the Baptists. It originated in revivals which took place under the preaching of the Rev. John Winebrenner, a German Reformed pastor, at Harrisburg, Pa. Mr. Winebrenner's views having undergone some change, he met with other ministers, in 1830, and they adopted a basis of church organization, the leading points of which were that the believers in any given place are, under the divine order, to constitute one body; that division into sects and parties under human names and creeds is contrary to the spirit of the New Testament; that the believers of any community, organized into one body, constitute God's household or family, and should be known as the Church of God; that the Scriptures, without note or comment, constitute a sufficient rule of faith and practice, while creeds and confessions tend to divisions and sects; and that the ordinances of immersion in water in the name of the Trinity, the washing of the saints' feet, and the partaking of bread and wine in commemoration of the suffering and death of Christ, are binding upon all believers. The organization of the church consists of 17 annual elderships, covering districts in 16 States, Oklahoma, and the Indian Territory, and a general eldership, composed of delegates from the annual elderships, meeting every four years, which has charge of general concerns, with various boards serving four years. The words "Church of God" in the titles of the general and annual elderships were changed in 1896 to "Churches of God." No official statistics are compiled. The ministerial register for 1905 contained 479 names. Other estimates for 1905 give 580 churches and 38,000 communicants. The denomination has a college at Findlay, Ohio, with an endowment approaching $100,000, a collegiate institute at Fort Scott, Kans., and an academy at Barkeyville, Pa.; has a large bookstore and publishing house at Harrisburg, Pa.; sustains four missionaries in India, in part of the territory assigned to the Free Baptist church, and is also represented by missionaries working in other foreign fields and under other boards; and has, further, an active Woman's Missionary Society. It is interested in beneficiary education for the ministry and is making progress in educational matters generally. Its organs are: *The Church Advocate*, weekly; *The Workman Quarterly*, *The Sunday School Gem*, *The Sunbeam*, *The Primary Quarterly*. Consult: Winebrenner, *A Brief View of the Church of God* (Harrisburg, Pa., 1840); id., *Practical and Doctrinal Sermons* (ib., 1860); a *History and Doctrines of the Churches of God* is in preparation by J. H. Forney.

CHURCH OF GOD IN CHRIST. See MENNONITES.

CHURCH OF JESUS CHRIST OF LATTER-DAY SAINTS. See MORMONS.

CHURCH OF THE BRETHREN, THE. A considerable body of Christians, also known as DUNKERS, or DUNKARDS, and among themselves as Brethren, whose faith and practice are not generally known outside of the localities in which they live. Thus the reiterated statements that they are celibates, that they discourage marriage, that they do not marry outside of their own fraternity, that they keep the seventh day as the Sabbath, that they live in communities, and other similar errors set forth in the books, always have been without foundation. The movement which resulted in the closer organization of the Church of the Brethren grew out of the great religious awakening which

occurred in Germany in the latter part of the seventeenth century, when large numbers, becoming dissatisfied with the lack of spirituality in the state church, withdrew from its communion. They organized at Schwartzenau, Germany, in 1708, with Alexander Mack as their first minister; but in no way do they regard him as the founder of the church.

Driven by persecution to Wittgenstein, they rejected all human creeds and accepted the gospel of Jesus Christ as their rule of faith and practice. The church suffered from persecution and finally emigrated (1719–29) to America, settling near Germantown, Pa., where the first church in this country was organized in 1723. Among the early emigrants was Christopher Saur, who was the first in America to print the Bible in a European tongue. From this nucleus the church spread southward and westward, and flourishing congregations are now to be found in most of the States. They are, however, most numerous in Pennsylvania, Maryland, Virginia, Ohio, Indiana, Illinois, Iowa, Missouri, Nebraska, Kansas, and North Dakota. At the annual conference held in 1913, 30 States and several foreign countries were represented. They now number about 120,000 communicants, have 1240 congregations, with 3485 ministers, who, as a rule, serve without salary. They are largely engaged in agricultural pursuits, though in recent years the denomination has expanded to include many prosperous city churches, with pastorates filled by men of liberal education. The denomination supports 10 colleges. They are: Juniata College, Huntingdon, Pa.; Mt. Morris College, Mt. Morris, Ill.; Bridgewater College, Bridgewater, Va.; McPherson College, McPherson, Kans.; Botetourt Normal College, Daleville, Va.; Lordsburg College, Lordsburg, Cal.; North Manchester College, North Manchester, Ind.; Elizabethtown College, Elizabethtown, Pa.; Blue Ridge College, New Windsor, Md.; Bethany Bible School, Chicago, Ill. Missions have been established in Denmark, Sweden, Asia Minor, and India. There are about 60 missionaries in India and China, with 1500 converts. A theological school has been opened at Bulsor, India. The Missionary Society has an endowment fund of nearly $500,000. A large and well-appointed publishing house, located at Elgin, Ill., is owned by the church. The *Gospel Messenger*, the church paper, has a circulation of over 24,000.

In doctrine the Brethren are strictly orthodox. They hold the Bible to be the inspired and infallible word of God, and accept the New Testament as their only rule of faith and practice. They believe in the Trinity, in the divinity of Christ, in the Holy Ghost, and in future rewards and punishments. In the subtleties of speculative theology they take but little interest. Faith, repentance, and baptism are held to be the conditions of salvation. These three constitute true promise of the forgiveness of sins and the gift of the Holy Ghost. In practice they follow closely the Scripture teaching and observe the primitive simplicity of the apostolic church; hence they regard nonconformity to the world as an important principle. They enjoin plainness of dress, settle their difficulties among themselves without going to law, affirm instead of taking oath, refrain from taking a prominent part in politics, are opposed to secret societies, advise against the use of tobacco, and have a rule more than a century old against the manufacture, sale, and use of intoxicants. As early as 1782 they prohibited slavery and pronounced in strong terms against the slave trade. They baptize believers only, dipping them face forward at the mention of each name in the Trinity given in the baptismal formula in Matt. xxviii. 19. Communion is observed in the evening, after a full meal called the Lord's Supper. Before the supper the ordinance of foot washing is observed, the brethren washing one another's feet, and the sisters performing the same service among themselves. After supper, before the communion is taken, the sexes extend the right hand of fellowship and exchange the kiss of peace. Bishops, or elders, ministers in the first and second degree, and deacons, are elected by the congregations. Ministers are advanced from the first to the second degree, and bishops are chosen from the latter and ordained by the imposition of hands. Congregations are organized into State districts, and both elect delegates to the annual conference, which is the chief ecclesiastical body. Here the fullest and freest discussion of all questions coming before the assembly is permitted. The final decisions are rendered by a two-thirds vote of the churches. Women are eligible to serve as delegates in conference.

In 1881–83 the church suffered the loss of about 8000 communicants by a division in its ranks, resulting in the secession of two parties, known as the Old-Order and Progressive Brethren. The former objected most seriously to the advance the church was making in educational, missionary, and Sunday-school work, while the latter insisted strenuously that the church was too conservative, that the rules laid down by the annual conference were oppressive, and that greater liberty should be enjoyed in matters of dress. After some years of contention these parties withdrew from the mother church and formed separate organizations. The Old-Order Brethren in 1913 had 222 ministers and about 3500 members. They determinedly oppose higher education, missionary work, Sunday schools, and revival services. They publish a paper, the *Vindicator*. In 1890 the Progressive Brethren numbered 8000 and have since then increased, claiming 22,000 members and 300 ministers in 1914. They have a college at Ashland, Ohio, where their publishing house is located. The *Evangelist*, their church paper, circulates generally among the members of their body. For the German Seventh-Day Baptists, an early offshoot of the German Baptist Brethren, see BAPTISTS.

Bibliography. Brumbaugh, *History of the Brethren; Two Centuries of the Church of the Brethren* (Elgin, Ill.); Yoder, *God's Means of Grace, on the Doctrines;* Kurtz, *An Outline of the Fundamental Doctrines of Faith;* Carroll, *Religious Denominations of the United States* (new ed., 1912).

CHURCH OF THE NEW JERUSALEM. See SWEDENBORGIANS.

CHURCH RATES. In England, a tax or assessment laid on the parishioners and occupiers of land within a parish, by a majority of their own body in vestry assembled, for the purpose of upholding and repairing the fabric of the church and the belfry, the bells, seats, and ornaments, the churchyard fence, and the expenses (other than those of maintaining the minister) incident to the celebration of divine service. The parishioners are convened for this

purpose by the churchwardens. The chancel being regarded as belonging peculiarly to the clergy, the expense of maintaining it is laid on the rector or vicar, though custom frequently lays this burden also on the parishioners, as in London and elsewhere.

The church rates were anciently a charge on the tithes of the parish, which were divided into three portions—one for the structure of the church, one for the poor, and the third for the ministers of the church. This distribution is said to have originated with Pope Gregory I, who enjoined St. Augustine thus to divide such voluntary offerings as might be made to his missionary church in England. A canon of Archbishop Ælfric in 970, and an Act of the Witenagemote in 1014, in Ethelred's time, have been quoted in proof of the recognition of this rule by our Saxon fathers. It seems to have been their custom, also, to devote to the repair of each church a portion of the fines paid for offenses committed within the district attached to it; and every bishop was bound to contribute to the repair of his own church from his own means. A third of the tithes thus originally devoted to the repairs of churches continued to be applied to that purpose under the Normans down to the middle of the thirteenth century; and the manner in which this burden came to be shifted to the parishioners has been a subject of much discussion among legal antiquarians. Lord (then Sir John) Campbell, who published a pamphlet on the subject in 1837, is of opinion that the contributions of the parishioners were at first purely voluntary, and that, the custom growing, it at last assumed the form of an obligation and was enforced by ecclesiastical censures. The care of the fabric of the church and the due administration of its offices are laid upon the ministers and the churchwardens conjointly, and the latter may be proceeded against by citation, in the ecclesiastical courts, should they neglect these duties. But there is no legal mode of compelling the parishioners as a body to provide the rate; and this circumstance has occasioned much difficulty in imposing the tax in parishes in which dissent is prevalent and led to many churches falling into a partially ruinous condition. The proper criterion for the amount of church rates is a valuation of the property within the parish, grounded on the rent that a tenant would be willing to pay for it. Glebe land, the possessions of the crown in the actual occupation of the sovereign, and places of public worship, are not liable for church rates; but there is no other exception as regards immovable property, and in some parishes custom even extends it to stock in trade. It has been often decided in the courts that a retrospective church rate—i.e., a rate for expenses previously incurred—cannot be validly imposed. Much difficulty has been experienced in recovering the rates imposed by the parish on individuals refusing to pay. Previous to 53 Geo. III, c. 127, the only mode was by suit in the ecclesiastical court. That statute, however, in all cases under £10, empowered the justices of the peace of the county where the church was situated, on complaint of the churchwardens, to inquire into the merits of the case and order payment. Against the decision of the justices an appeal lies to the quarter sessions. In 1868 an end was put to all parochial contentions by enacting that no suit or proceeding should thereafter be allowed in any court to enforce or compel payment of a church rate, except where a local act authorized this rate. But, except so far as related to the compulsory payment of these rates, the churchwardens might, as before, make, assess, receive, and deal with such rates. In each district parish the inhabitants may treat their own church as if it were their parish church and make and receive rates for the repair of the same. A body of trustees may now be appointed in each parish to receive contributions for ecclesiastical purposes in the parish.

CHURCH, STATES OF THE. See PAPAL STATES.

CHURCH TEMPERANCE SOCIETY. A national organization of the Episcopal church in the United States for the promotion of temperance. It was founded in New York in 1881, on the lines which the Church of England Temperance Society had been pursuing for 10 years previously. Its president is the presiding bishop of the church. The society stands for a policy of high license as opposed to prohibition and has done effective work through legislative channels. It conducts the Squirrel Inn Free Reading Room on the Bowery in New York City and maintains the Longshoreman's Rest. Among other agencies are ice-water fountains, lunch wagons, coffee-houses, workingmen's clubs, and other attractive, wholesome resorts. In connection with the society's work there is a Church Temperance Legion, which provides moral, civic, and military training for boys.

CHURCH TRIUMPHANT, THE. A church founded by George Schweinfurth, who was born in Marion, Ohio, in 1853. He left the ministry of the Methodist Episcopal church soon after entering it and became a follower of a Mrs. Beekman, who professed to be "the spiritual mother of Christ in His second coming." Before her death, in 1883, she declared Schweinfurth to be "the Messiah of the New Dispensation," and her followers adhered to him. He claimed to have received the same spirit as Christ and to be equal with Him and sinless, and to have power to perform miracles, to bestow the spirit upon others, and to free from the curse and save from the commission of sin. The Church Triumphant does not believe that Christ was essentially divine, but that He was a man who had experienced freedom from the power and curse of sin and then received the spirit of God and became divine. The religious services are without rites, ceremonies, or forms of worship, and consist chiefly of the reading of the sermons prepared by Schweinfurth. The principal centre of this church is at a place called Mount Zion, near Rockford, Ill., where it has a special building. According to the latest published enumeration, it has 12 societies, with 384 members, in the States of Colorado, Illinois, Kentucky, Michigan, and Missouri. Consult H. K. Carroll, *The Religious Forces of the United States* (New York, rev. ed., 1912).

CHURCHWARDENS. In England, ecclesiastical officers, elected sometimes by the parishioners and ministers jointly, sometimes by the minister alone, and sometimes by the parishioners alone, for the purpose of protecting the edifice of the church, superintending the celebration of public worship, and to form and execute other parochial regulations. They are generally two in number. (See CHURCH RATES; PARISH; VESTRY.) In the Protestant Episcopal church of the United States wardens are annually elected by each parish in Easter week; their duties, which are regulated by diocesan

and not by general canons, being the same as those of the corresponding English officials, omitting only such as relate to a church established by the state.

CHURCH'YARD, THOMAS (?1520–1604). An English author, born at Shrewsbury. He was a servant in the household of the Earl of Surrey, and a soldier of fortune in Ireland, the Low Countries, and France, and from 1560 poured forth an amazing number of broadsides, pamphlets, and other more pretentious works. Disraeli (*Calamities of Authors*) says that "he was frequently employed to supply verses for court masques and pageantry," and he composed such pieces for the entertainment of Queen Elizabeth at Bristol and Norwich. He died in poverty and neglect. His best effort is *The Worthiness of Wales* (1587; reissued in facsimile in 1876 by the Spenser Society), a national poem of some interest to the antiquarian and historian. Consult Collier's edition of *Churchyard's Chippes* (1870) and a memoir by Adnitt (1884).

CHURL. See CEORL.

CHURN (AS. *cyrin,* Icel. *kirna,* Dan. *kjærne,* churn, dialectic Ger. *Kern,* NIcel. *kjarna,* cream). A machine for agitating milk or cream for the production of butter. The principle of the operation is considered in the article on BUTTER MAKING (q.v.). The oldest form of churn was a bag of skins, in which the cream was agitated. The upright or plunger churn was laborious and was superseded by the dash churn, and by a form in which the cream was agitated by means of floats or paddles. There were many kinds of these, with arrangements for cooling or heating the cream. But these injured the texture of the butter, because of the effect of the stirring motion on the grain of the first particles of butter formed. Barrel churns and rectangular churns, hung upon the shorter axis, have come into very general use, and box churns which are oscillated, often called swing churns, are much used, especially in small dairies.

The best churns are entirely hollow vessels of the barrel or box shape, which agitate the cream through concussion of the particles upon the sides of the churn. The churn should not be entirely filled; it should be left half, or preferably only one-third, full. Although the yield of butter is not much diminished by increasing the amount churned at one time, the time required for churning is increased, and the temperature is raised at the end of churning, which is decidedly injurious to the butter, making it softer and more difficult to handle. Too rapid churning gives the cream the motion of the churn, and the particles of butter fat are not brought into contact with each other. The labor of churning has been very greatly decreased in the modern churn, and forms have been made in which dog power, horse power, and steam power are employed. The power churns, of immense size, are usually employed in creameries. The combined churn and butterworker has been described under BUTTERWORKER (q.v.). The butter extractor is essentially a cream separator and continuous churn combined. The butter made with this machine is, of course, sweet-cream butter.

CHURN OWL, or **CHURR OWL.** A name in Great Britain for the nightjar (q.v.).

CHUROYA, chōō-rō'yȧ. A tribe living in eastern Colombia. They are of low physical type, very ugly, and go generally naked, decorating their bodies with tattooing, in default of clothing. With several other tribes of the same region, they constitute a distinct linguistic stock, to which belongs also the Guahibo (q.v.), formerly considered independent. Rivet and Chamberlain prefer to term the stock "Guahiban." Consult Chamberlain in *Journ. de la Soc. des Amer.,* N. S., vol. vii, 1910, p. 186, and Rivet in *L'Année Linguistique,* vol. iv (1908–10), 1912, pp. 128–131.

CHURRIGUERESQUE (chur'rĭ-gȧ-rĕsk') **ARCHITECTURE.** This style derives its name from Don José Churriguera (died 1725), a Spanish architect and sculptor. In 1689 he executed the catafalque for the obsequies of the Queen Maria Louise. After 1690 he was employed on various royal works—a portal for S. Gaetano, a palace for a prince, and various altars and works of sculpture. The Churrigueresque style marks the last stage of the baroque period in Spain. In it the original classic motives have become utterly degenerate, and nothing is considered except picturesqueness of effect in composition and decoration.

The style of Churriguera is one of the most important elements of Mexican architecture, which derived additional picturesqueness from the Indian workmen, who had not lost the Aztec traditions. Many picturesque Mexican portals, altarpieces, and interiors exhibit the style.

CHUR'RUS. See HEMP.

CHURUBUSCO, chōō'rōō-bŭs'kō. A village 6 miles south of the city of Mexico, on the river Churubusco, connected with the capital by an elevated paved causeway. Before the conquest by Spain it was the capital of a powerful native kingdom, and is said to have had as many as 50,000 dwellings, and many temples and lofty towers. But by 1642 it had become a miserable village. Here, on Aug. 20, 1847, immediately after the battle of Contreras, occurred one of the most important battles in the war between the United States and Mexico. The Mexicans, under the command of Santa Anna, numbered about 30,000, most of whom were stationed in a strongly fortified *tête-de-pont,* and in the large convent or church of San Pablo. The Americans, numbering about 9000, and commanded by Gen. Winfield Scott, attacked with the greatest gallantry, and finally, after three hours of fighting, drove the Mexicans from their position. The Mexicans lost, in killed, wounded, and prisoners, fully 7000; the Americans, in killed and wounded, about 1100. Consult: Wilcox, *History of the Mexican War* (Washington, 1892); General Scott, *Autobiography* (New York, 1864); and Bancroft, *History of Mexico,* vol. v (San Francisco, 1885).

CHUSAN, chōō'sȧn (Chinese, Boat Island). An archipelago off the coast of China, consisting of the island of the same name and a few smaller islands (Map: China, F 5). The island of Chusan is situated about 40 miles northeast of Ning-po, lat. 30° N., long. 122° E., is of an oblong shape, and about 50 miles in circumference. Its surface is mountainous; but there are many fertile valleys with a plentiful supply of water, and the soil is very carefully cultivated by the hardy and independent people who inhabit the island. The flora is of remarkable richness. Azaleas clothe the mountains; clematis, roses, and honeysuckle grow in great luxuriance. The camphor and tallow tree, and many varieties of bamboo, are found in the valleys. Tea is cultivated to some extent on

the hillsides. Among the minor islands the most interesting is Putu, an islet covered with temples and inhabited by numerous monks, and consecrated entirely to religious purposes. Administratively the group belongs to the Province of Che-kiang. Population is estimated at (1910) 250,000. The chief settlement is Ting-hai, a fortified town, with a population of about 30,000. The island of Chusan was an important commercial entrepôt of the Japanese occupation during the Ming dynasty. It was occupied by the British from 1840 to 1846 and again in 1860.

CHUTIA NAGPUR, chōō'tē-ä nâg-pōōr'. See CHOTA NAGPUR.

CHUT'NEE, or CHUTNY (Hind. *chatnī*). An East Indian condiment, a compound of mangoes, chillies or capsicum (q.v.), and lime juice, with other native fruits, such as tamarinds, the flavor being heightened by garlic.

CHUTTA NAGPUR. See CHOTA NAGPUR.

CHUZZLEWIT, MARTIN. The hero of Dickens's novel of the same name. He is, at first, an unsuccessful apprentice to a hypocritical architect named Pecksniff. He leaves the latter in contemptuous anger, goes to America, and, after making various amusing acquaintances there, falls ill, and is brought back by his faithful follower, Mark Tapley. He is finally reconciled with his exacting grandfather, also named Martin, and marries a protégée of the latter, with whom he has long been in love.

CHWI. See SUDAN.

CHWOLSON, kvôl'sôn, DANIEL ABRAMOVITCH (1819–1911). A famous Russian archæologist. Born of Jewish parentage at Vilna, he received his education at Breslau, Vienna, and St. Petersburg, mastering German, French, and Russian, and then devoting himself to the study of Oriental languages, especially Arabic. In 1850 the University of Leipzig conferred the doctor's degree upon him for a scholarly dissertation on Semitic religious history. Five years later, having returned to Russia and embraced Christianity—a thing frequently done by intellectual Jews in Russia as an indispensable means to recognition—he was appointed professor of Oriental languages at St. Petersburg University and of Hebrew and biblical archæology at the ecclesiastical academy in the same city. So great was his scholarship in his special field, that only a year after these appointments (in 1851) the Russian Imperial Academy published his first long work at its own expense—an unusual honor. The publication of this book—an elaboration of his doctor's dissertation already referred to—at once established its author's reputation. The works that followed made him one of the foremost authorities on the history of Oriental religions, and gave him considerable prestige in his defense of the Jews, whose cause he ever championed. Chwolson's principal works, devoted chiefly to Oriental ethnography, are: *Die Ssabier und der Ssabismus* (2 vols., 1856), a source book indispensable to students of religious history; *Concerning Some Mediæval Accusations Against the Jews* (in Russian, 1859); *Ibn Dasta's Accounts of the Kharzars, Burtassi, and Bulgarians* (in Russian, 1867); *Die semitischen Völker* (1872); *The Lord's Last Supper and the Day of the Crucifixion* (in Russian, 2d ed., 1880; German, 2d enlarged ed., 1908), in which he aims to shatter the traditional views concerning Christ's death, etc.; and *Die Blutanklage und sonstige mittelalterliche Beschuldingungen der Juden* (1901), a most scholarly historical study of "ritual-murder" accusations against the Jews.

CHYLE, kīl (from Neo-Lat. *chylus*, from Gk. χυλός, *chylos*, juice, from χεῖν, *chein*, to pour). A product of the digestion of food in the alimentary canal. On remaining for some time in the stomach, food is partially dissolved, forming a thick, grayish, turbid liquid called *chyme*. The chyme, which passes onward into the small intestine, is acted upon by the bile, pancreatic fluid, and intestinal juice, and separated into *chyle*, which is absorbed or sucked up by the lacteals (q.v.), and into waste matters, which ultimately find their way out of the system through the lower bowel. The manner in which chyle is taken up by vessels distributed over the small intestines, and the changes it undergoes before it is absorbed into the blood, are described in the articles LACTEAL, THORACIC DUCT, and NUTRITION. When obtained from the thoracic duct of an animal during the process of digestion, chyle is a white milky-looking or yellowish fluid, with a faintly alkaline reaction. Like the blood, it coagulates after its abstraction from the body of the animal; and a small but distinct gelatinous clot is separated from the serous fluid of the chyle. On examining chyle under a microscope, we find that it contains numbers of white corpuscles, oil globules of varying sizes, and fatty granules. Each oil droplet is enveloped in an albuminous envelope. The chemical constituents of chyle are neutral fats, some fatty acids, lecithin, cholesterin, serum albumin, globulin, fibrin, sugar, urea, leucin, sodium chloride, phosphates, and traces of iron. See DIGESTION.

CHYME, kīm. See CHYLE; DIGESTION.

CHYTRÄUS, kē-trā'ōōs (Neo-Lat., from Gk. χυτραῖος, *chytraios*, made of earthenware, from χύτρα, *chytra*, pipkin; a translation of his family name *Kochhafe*, lit. cooking pot), DAVID (1531–1600). A Lutheran theologian. He was born at Ingelfingen, Württemberg, studied at Tübingen and Wittenberg; was a pupil of Melanchthon, and became professor of theology at Rostock (1551). His learning and talents gave him a high position, and he was employed by Maximilian II to arrange the affairs of the Evangelical church in Austria. He was the principal author of the statutes of Helmstedt, and one of the authors of the *Formula of Concord*. He left a number of important theological works. His biography has been written by Bressel (1863) and Krabbe (1870).

CIALDINI, châl-dē'nē, ENRICO, DUKE OF GAETA (1811–92). An Italian general, politician, and diplomat. He was born at Castelvetro, near Modena, and studied in the University of Parma. He took part in the insurrection of 1831, and was forced to escape to Paris. In 1833 he fought in Portugal, and in 1835 joined the Spanish army. At the outbreak of the revolution of 1848 Cialdini took command of a regiment of Piedmontese infantry, and subsequently was captured by the Austrians. In the Crimean War he commanded the third division of the Sardinian contingent, and took a distinguished part at the battle of the Tchernaya. At the beginning of the War of 1859 he was intrusted by Cavour with enlisting the famous corps of sharpshooters known as the Cacciatori delle Alpi ('Hunters of the Alps'), afterward commanded by Garibaldi. The fourth division of the army was led by Cialdini, who won the victory of Palestro, but further progress of the Italians was stopped by the Peace of Villafranca.

In 1860 Cialdini defeated the papal army under General Lamoricière, at Castelfidardo. On Feb. 13, 1861, Gaeta yielded to Cialdini. He was now made general of the army and Duke of Gaeta, and Reggio elected him deputy. He became senator in 1864, and took a prominent part in the campaign against Austria in 1866, replacing Lamarmora as chief of the general staff. In 1876–79 and 1880–81 he was Ambassador to France. Consult Misco, *Cialdini e i suoi tempi* (Naples, 1893).

CIAMICIAN, GIACOMO (1857–). An Italian chemist, born at Triest, Austria-Hungary. He was educated at the University of Vienna. In 1880 he became assistant at the Chemical Institute of Rome, in 1887 professor of general chemistry at Padua, and after 1889 was ordinary professor of general chemistry at Bologna University, Italy. In 1910 he became a member of the Italian Senate. Besides his contributions on pyrrols, on plant substance, and on photochemistry, he is author of *I problemi chimici del nuovo secolo* (1903; 2d ed., 1905); *Organico e fisiologico chimica* (1908); *Cooperazione delle scienze* (1911); *Fotochimica nell' avenire* (1912).

CIAMPI, chäm'pē, IGNAZIO (1824–80). An Italian poet and historian, born in Rome. He studied law there, attained considerable reputation as an attorney, and became a member of the Roman Council of State. From 1874 until his death he was professor of modern history at the University of Rome. Among his poetical works are imitations of Pushkin (1855), *Serena* (1857), the collection *Poesie varie* (1857), the epic *Stella* (1858), and a complete edition entitled *Poesie* (1880). His valuable historical studies include *La città etrusca* (1866), *Innocenzo X e la sua corte* (1878), and, most important, the *Storia moderna della scoperta dell' America alla pace di Westfalia* (2 vols., 1881–83, ed. by Castagnola).

CIAMPI, SEBASTIANO (1769–1847). An Italian author, born at Pistoja. From 1803 to 1818 he was a professor in the University of Pisa, and from 1818 to 1822 at Warsaw. His publications include *Memorie della vita di Messer Cino da Pistoja* (1808), *De Usu Linguæ Italicæ saltem a Sæculo Quinto* (1817), and a *Bibliografia critica delle antiche reciproche corrispondenze dell' Italia colla Russia, Polonia,* etc. (1834–43). He did much to further the study of art history and translated Pausanias.

CIAMPOLI, chäm'pō-lē, DOMENICO (1855–). An Italian author, born at Atessa, in the Abruzzi. He was called to the chair of the history of literature in the Lyceum of Ancona, and later became librarian at the Victor Emmanuel Institution in Rome. He wrote chiefly stories of Apennine life. The *Fiabe abruzzesi* (1877) and *Cicuta* (1884) are examples. As a critic of Slavic literature he published *Melodie russe* (1881) and other volumes, including some versions of Dostoyevski. He also wrote *Nuovi studi letterarii e bibliografici* (1899).

CIANCA, thē-än'thä, ANDRÉS DE (c.1500–?). A Spanish judge, born at Peñafiel. He went to Peru with Pedro de la Gasca in 1546, became a member of the royal audience, and was president of the audience in 1550–51, from the departure of Gasca for Panama until the arrival from Spain of Don Antonio de Mendoza, the second Viceroy. He was a judge of the court-martial which, after the battle of Sacsahuana, in 1548, condemned to death Gonzalo Pizarro (q.v.) and Francisco de Carbajal (q.v.).

CIARDI, chär'dē, GUGLIELMO (1844–). An Italian painter. He was born in Treviso and studied at the Academy of Venice under Bresolin and at Florence, Rome, and Naples. After extensive travels in Europe he settled in Venice in 1874. His representations of the Dolomites and mountainous regions about Treviso, his views of Venice and the lagoons, with their remarkable light effects, have gained universal favor and been widely and successfully exhibited. His fine landscape, "Messidoro" (1883, Galleria Moderna, Rome), made him the recognized leader of the Venetian *plein air* painters. Other works are: "Morning in the Alps" (Moriza), "Grand Canal" (Berlin, 1896), "October in the Venetian Campagna" (Glasgow, 1904), "Lake of Weissenfels" (Luxembourg, 1909). Consult Willard, *History of Modern Italian Art* (London, 1902).

CIBAO, sē-bä'ō. A picturesque mountain range of Santo Domingo, Haiti (q.v.), in the central part. It extends 20 miles from northwest to southeast and attains an altitude of over 7000 feet in the highest peaks of the island. The chief rivers of Haiti rise in the range; between the mountains and along the north coast extend the fertile valley and plain of Santiago, watered by the Yaqui. Columbus supposed the range to be part of the Cipango (Japan) of Marco Polo. Gold in considerable quantities has been found here since Ojeda's first expedition of discovery in 1494.

CIBBER, sĭb'bĕr, CAIUS GABRIEL (1630–1700). A Danish-English sculptor, born at Flensburg, in Schleswig. He was sent to Rome to study, and then went to England with the sculptor Stone. Among his works are the strong and decorative figures of "Melancholy" and "Raving Madness," once over the entrance to the Bethlehem Hospital, but now in the South Kensington Museum; the phœnix above the south door of St. Paul's Cathedral, and one of the bas-reliefs on the monument commemorating the fire of London. His son was Colley Cibber, the actor and dramatist.

CIBBER, COLLEY (1671–1757). An English actor and dramatist, born in London. In 1682 he was sent to the free school at Grantham, in Lincolnshire. Five years thereafter he returned to London, and in 1688 was a volunteer in the forces raised by the Earl of Devonshire in support of the Prince of Orange. He afterward turned to the stage, and after performing gratuitously for several months, he obtained an engagement at 10s. per week, which was raised to 15s.; and on the commendation of Congreve, who had witnessed his performance of Lord Touchwood, five additional shillings per week were added. Cibber now began to take the leading parts in many comedies, and soon established his reputation as an actor. In the meantime he was writing comedies. *Love's Last Shift* was produced in 1696, and thereafter followed 29 more plays. As a dramatist Cibber claims to have done much towards the reformation of the stage. However immoral individual scenes in his plays may be, the libertines are reclaimed in the last act. As playwright and comedian he was closely connected with Drury Lane Theatre, of which he became manager in 1710. He retired from the stage in 1733, though after that date he occasionally reappeared. Three years before he had been appointed Poet Laureate. The poems he

now wrote were worthless, and exposed him to scathing ridicule. Pope made him the hero of the new *Dunciad* (1742). After retiring from the stage, Cibber began his famous *Apology*, which appeared in 1740 (an edition by Bellchambers, London, 1822; and another by Lowe, London, 1889). This book is not only an important history of the Queen Anne stage—it is one of the most amusing autobiographies ever written. Cibber died Dec. 12, 1757. His *Dramatic Works* with a biography appeared in 1760; new ed., 1777. Consult Cibber, *Apology*, ed. by Lowe (London, 1888), and the same editor, *Bibliographical Account of English Theatrical Literature* (1895).

CIBBER, SUSANNAH MARIA (ARNE) (1714–66). An English actress. She received instruction in music from her brother, Dr. T. A. Arne (q.v.); first appeared publicly in 1732, and rose to great public favor in opera and oratorio. She was an especial favorite with Handel and was the first Galatea in his *Acis and Galatea*. He wrote the contralto songs in the *Messiah* and the part of Micah in *Samson* expressly for her. Two years after her marriage to Theophilus, son of the dramatist Colley Cibber, which took place in 1734 and proved very unhappy, she appeared as an actress, especially in tragedy, excelling as Constance of Bretagne in *King John* and as Ophelia in *Hamlet*. She played with Garrick at Drury Lane after 1753.

CIBOL, sĭb'ŏl. See ONION.

CIBO'RIUM (Lat., from Gk. *κιβώριον, kibôrion*, shell, cup). A term used mainly in two distinct senses: (1) for an altar canopy, and (2) for a vase to contain the reserved Sacrament, from which communion is ordinarily given in the Roman Catholic church. From the earliest times after Christianity emerged from the catacombs (fourth century) the high altar in a Christian church or basilica was surmounted by a canopy resting on columns, and made of gold, silver, bronze, or marble. These canopies were among the richest pieces of church furniture and were decorated with reliefs, statues, and a variety of architectural details. The earliest metal ciboria, of which many superb examples were given by the popes to Roman churches, have not survived the melting pot. The marble ones of the sixth century, at Ravenna and Parenzo, are among the earliest. That given by Justinian (sixth century) to St. Sophia, in Constantinople, was the most sumptuous. Of mediæval marble examples, there are many in Rome; of the classic type, at San Lorenzo in Campo Verano and San Giorgio in Velabro; of the Gothic type, at Santa Cecilia and the Lateran, decorated with mosaics and sculpture. A remarkable Lombard example is at Sant' Ambrogio, Milan; another at San Marco, Venice. Many others are in the churches of southern Italy (eleventh to fourteenth century). This custom was abandoned throughout Europe, except in Italy, after the thirteenth century, the altar being left uncovered. Since the sixteenth century the ciborium, in this sense, has been called in Italy a baldachin (q.v.). See ALTAR; CANOPY.

The second meaning, which is now the more usual, designates a closed vase to contain the Host. Such receptacles were originally (fourth to eighth century) in the form of a dove, made of gold, silver, or gilt copper, suspended over the high altar from the ciborium. Sometimes they were inclosed in a tabernacle in the shape of a tower. Then the dove-shaped receptacles were, in the ninth century, replaced by pyxes (q.v.) or small cylindrical boxes of gold, silver, ivory, etc. These were suspended over the altar or placed in a small niche in the wall near the altar, in churches where there was no ciborium over the altar. The primitive connection between the constructive ciborium and this receptacle for the reserved Sacrament caused the name ciborium to be applied to the latter in late mediæval times, when the use of the constructive ciborium had ceased; but the term pyxis is the more correct name. The wall niche in which the ciborium is placed was also called ciborium; it had decorative architectural door-reliefs and a frontispiece; and some of those executed during the Italian Renaissance are exquisitely sculptured.

CIBRARIO, chê-brä'rê-ō, GIANNI ANTONIO LUIGI, COUNT (1802–70). An Italian historian and politician. He was born in Turin, studied at the university of that city, and took his degree of doctor of laws in 1824. King Charles Albert of Sardinia, with whom he was a great favorite, sent him in 1848, when Italy rose against the Austrians, as royal commissioner to Venice. During the same year he was created a senator of the kingdom. When Charles Albert—after the unfortunate issue of the war—went to live in voluntary exile at Oporto, Cibrario was sent by the Sardinian Senate to induce him to return. In 1850 he was appointed Superintendent General of Customs, and negotiated a treaty of commerce with France. In 1852 he was made Minister of Public Instruction by Victor Emmanuel, and in 1855 he became Minister of Foreign Affairs in Cavour's cabinet. He resigned his position in the following year, and he thenceforth devoted himself mainly to historical research. In the capacity of a mediator he negotiated a treaty which guaranteed the liberties of the Republic of San Marino with the Italian government in 1860. He died at Salò, in the Province of Brescia, 10 years later. His fame as an historian rests on the following works: *Notizie sulla storia dei principi di Savoia* (1825); *Delle storie di Chieri* (1827); *Dell' economia politica del medio evo* (1839); *Storia della monarchia di Savoia* (1843); *Storia di Torino* (1847); *Della schiavitù e del servaggio e specialmente dei servi agricoltori* (1868). Consult Odorici, *Il Conte Luigi Cibrario* (Florence, 1872).

CICA'DA. One of the Cicadidæ, a family of homopterous bugs, composed, for the most part, of large insects, very few measuring less than one inch across the opened wings, while many are as large as seven inches. The fore wings are usually transparent, but in some forms are highly pigmented, especially with black and yellow. About 800 species are known, mostly tropical.

Habits, etc.—The life of an adult cicada is noisy and short. These are, indeed, the noisiest insects in the world. Darwin heard them while on the *Beagle*, when it was anchored a quarter of a mile from shore. Only the males give the note. "Happy," said the Greek poet Xenarchus, "the cicadas' lives, for they all have voiceless wives." As no special auditory organs have been detected, it has been suggested that cicadas are capable of feeling rhythmical vibrations only. The sound-making organs which the males possess fully developed, and the females only partly, are peculiar to the cicadas. They consist of

enlargements of the metathoracic epimera, in the form of an opercular covering beneath which there is a very complicated apparatus. The sound is made by the rapid vibration of one of the membranes called the timbal. The other two membranes probably are set in vibration by the first and, in connection with the opercula, the three stigmata, and the whole skeleton of the insect, intensify the sound. The females are provided with powerful ovipositors. The eggs are deposited in the twigs of trees or shrubs or in the stems of herbs. The young hatch out in a few weeks, drop to the ground, and begin there a long subterranean existence. They feed on the sap from the roots of trees. The larvæ may penetrate as deep as 20 feet below the surface of the ground, where it is difficult to make out their life history. The manner of transformation from the larva to the pupa we do not know. The pupa is incased in a hard shell and when about ready to emerge from the ground may construct a chimney of earth several inches in height, but whether this is a purposeful act or not we do not know. When the pupa crawls out of the ground it fastens itself to some firm object, such as a wooden fence or a tree trunk, the skin splits along the dorsal line of the thorax, and through this the adult winged insect emerges. The pupal skin when dried still retains the shape of the pupa, and may be found attached to the support several days after the adult has flown away.

In the United States the two commonest forms are the dogday harvest fly (*Cicada tibicen*) and the periodical cicada or 13 to 17 year locust (*Cicada septendecim*). The harvest fly is the black-and-green one that appears every year in midsummer and gives out its prolonged, shrill, and to many persons nerve-racking, cry from tree tops during the heated hours of the day; this form matures in two years, but since there are two different broods, one appears every year.

The Periodical Cicada.—This species requires from 13 to 17 years for development, according, mainly, to the temperature of the locality in which it breeds. Heat hastens its development, hence the 13-year forms occur in the South; but in each locality there are always some individuals that come out a year or two ahead of the main brood and others that lag a few years behind. This form has the greatest longevity of all insects. The time of its periodicity has been made out by noting its appearance in certain localities for a considerable number of years, 22 broods having thus been determined. Several of these broods, which are dimorphic, may coexist in the same locality. Hence larvæ of different ages, of several generations, may be found in the ground at one and the same time, and they will appear as adults in different years. The sound made by these insects is peculiar, very loud, and closely resembles the humming of a resonant telegraph pole when its wires are vibrating in a strong breeze.

Consult Woodworth, "Synopsis North American Cicadidæ," in *Psyche*, vol. v (Cambridge, Mass., 1888). For the 17-year locust, see "The Periodical Cicada," an illustrated monograph of 148 pages, by C. L. Marlatt, *Bulletin 14 of the United States Department of Agriculture* (Washington, 1898). See LOCUST.

CICADA KILLER. See SAND WASP.

CIC'ATRIZA'TION (from Fr. *cicatrisation*, from *cicatriser*, to scarify, from Lat. *cicatrix*, a scar). The process of healing or skinning over of an ulcer or broken surface in the skin or in a mucous membrane, by which a fibrous material, of a dense, resisting character, is substituted for the lost tissues. The new tissue is called the cicatrix, and consists of fibrous connective tissue, having a tendency to contract, a lack of elasticity, and a white, shining appearance. The glands and other special structures of the original tissue are wanting in the cicatrix. See INFLAMMATION; ULCER.

CICCIONE, chē-chō'nā, ANDREA, properly ANDREA DA FIRENZE, or ANDREA NOFRI (1388–c.1453). A Florentine sculptor and architect of the early Renaissance. He was born in Florence, studied under unimportant masters, and later imitated Donatello. His principal surviving work is in Naples—the large tomb of King Ladislas (1415), the unfinished half-Gothic tomb of Ser Gianni Caracciolo—both in the church of San Giovanni a Carbonare, and the richly decorated tomb of Count Fernando da San Serverino in the convent of Santa Monica. His work is somewhat heavy in character, and his style shows the transition from the Gothic to the Renaissance. He is supposed to have been architect of the monastery and church of Monte Oliveto and the cloisters of San Severino.

CICELY, sĭs'ē-lĭ (corruption of *seseli*, from OF., Lat. *seselis*, from Gk. σέσελι, *seseli*, cicely) (*Myrrhis*). A genus of umbelliferous plants, nearly allied to chervil. One species, sweet cicely (*Myrrhis odorata*), is common in the central and southern parts of Europe and in similar climates in Asia, but in Great Britain it appears to have been introduced. It is sometimes called myrrh in Scotland. It is a branching perennial 2 feet high or upward, with large, triply pinnate leaves and pinnatifid leaflets, somewhat downy beneath; the whole plant is powerfully fragrant, the smell resembling that of anise. The seeds, roots, and young leaves are used in Germany and other countries in soups, etc. The plant was formerly much in use as a medicinal aromatic. In the United States sweet cicely is the name given to the species of *Osmorrhia*, a genus closely related to *Myrrhis*.

CICELY. See CHERVIL.

CI'CER. See CHICK-PEA.

CIC'ERO, MARCUS TULLIUS (106–43 B.C.). The greatest orator of Rome, and one of the most illustrious of her statesmen and men of letters. He was born at Arpinum, Jan. 3, 106 B.C., of an ancient family, of the equestrian order. His father, himself a man of culture, and desirous that his son should acquire an eminent position in the state, removed him at an early age to Rome, where, under the direction of the orator Crassus, he was instructed in the language and literature of Greece and in all the other branches of a liberal education. In his sixteenth year he assumed the *toga virilis*, or manly toga, and was introduced to the public life of a Roman citizen. He now acquired a knowledge of law, and underwent a complete course of training in oratory. At the same time he studied philosophy under instructors of the Epicurean, Academic, and Stoic schools, and neglected no mental exercise, however arduous, which might conduce to his future eminence, being thus early of the opinion, which he afterward maintained in his treatise *De Oratore*, that an orator should possess almost universal knowledge. With the exception of a brief campaign under Sulla, in the Social War, he passed his time in these preliminary studies until his twenty-sixth year, when he began to plead in

public. In one of his earliest causes he distinguished himself by defending the rights of Sextus Roscius of Ameria, a private citizen, against one of the favorites of Sulla, who was then dictator.

Soon after, for the benefit of his health, and to pursue his oratorical and philosophical studies, he traveled to the chief seats of learning in Greece and Asia, and on his return was regarded as second to no orator at the Roman bar. Having been elected quæstor (76 B.C.), he was assigned by lot to Sicily, a post which he filled with ability, and to the satisfaction of those whom he governed. Some years after his return he laid the Sicilians under still greater obligation by his successful prosecution of their prætor, Verres, against whom he prepared no fewer than six orations, although the first had the effect of disheartening the accused so effectually that he voluntarily retired into exile. This was Cicero's first great triumph, for Verres had as his counsel and advocate the famous pleader Hortensius, who was at that time the acknowledged head of the Roman bar. In 69 B.C. Cicero filled the office of ædile, and in 66 that of prætor. Supported by Pompeius, whose favor he had gained by his advocacy of the Manilian Law, giving to that general the command of the Mithridatic War, Cicero was at length elected, by an overwhelming majority, to the consulship (63 B.C.). His tenure of office was rendered memorable by the conspiracy of Catiline, which he frustrated with admirable skill and promptitude. (See CATILINE.) The highest praises were showered upon him; he was hailed by Cato and Catullus as the "father of his country"; and public thanksgivings in his name were voted to the gods. But his popularity did not last long after the expiration of his consulship. His enemies charged him with a public crime in having put the Catilinarian conspirators to death without a formal trial, and he found it necessary to leave Rome and to take up his residence in Thessalonica (58 B.C.). A formal edict of banishment was pronounced against him, but he was recalled from exile in about 16 months, and on his return to Rome was received with great enthusiasm. See CLODIUS PULCHER.

His recovered dignity, however, soon excited the envy of the very party in the Senate with which he had desired to make common cause; while Pompeius and Cæsar, the greatest powers in the state, from whose enmity he had most to dread, courted his alliance and coöperation. Thus, while preserving an appearance of independence, he was betrayed into many actions which he could not but regard as humiliating, and which, by increasing the power of the triumvirs, led indirectly to the ruin of the Republic. A remarkable exception to this trimming policy is to be found in his assisting Milo when suing for the consulship. Against the wish of Pompeius, and in spite of the hostile feeling of the populace, he defended him after he had slain Clodius in an accidental encounter. During this period he composed his works *De Oratore*, *De Republica*, and *De Legibus*. After a year's administration of the Province of Cilicia (51–50 B.C.), he returned to Italy on the eve of the Civil War. With the convictions which he avowed, there was but one course which it would have been honorable for him to pursue—to enlist, at all hazards, on the side of Pompeius and the Republic. But instead of this he hesitated, balanced the claims of duty and of interest, blamed Pompeius for his want of preparation, and criticized the plan of his campaign, even after he had joined the army of the Senate, so that Pompeius found his coöperation more annoying than his opposition. After the battle of Pharsalus had wrecked the Pompeian cause Cicero abruptly quitted his friends and resolved to throw himself upon the generosity of the conqueror. After nine months' miserable suspense at Brundisium he was kindly received by Cæsar, whom he followed to Rome. During the years which ensued he remained in comparative retirement, composing his principal works in philosophy and rhetoric, including those entitled *Orator*, *Hortensius*, *De Finibus*, *Tusculanæ Disputationes*, *De Natura Deorum*, *De Senectute*, *De Amicitia*, and *De Officiis*. On the death of Cæsar he was disposed to unite his interests with those of Brutus and the other conspirators, but was restrained by dictates of prudence. In the civil disturbances which followed he espoused the cause of Octavianus, and composed his denunciatory orations against Antonius, which are known as the Philippics. These orations were the occasion of his death. When Octavianus and Lepidus joined with Antonius in a triumvirate, Cicero was among the proscribed, and his life was relentlessly sought. The soldiers of Antonius overtook him while his attendants were bearing him, now old and in an infirm state of health, from his Formian villa to Caieta, where he intended to embark. Forbidding his attendants to make any resistance, he offered his neck to the sword of his executioners. He died on Dec. 7, 43 B.C.

As a man Cicero was high-minded, generous, and possessed at all times of excellent intentions; yet he was lacking in moral courage; he was intensely egoistic and so unstable that he failed to impress his ideas upon those about him. His very sensitiveness and his high-strung, emotional nature, which made him so successful as an orator and as an interpreter of literary themes, were fatal to his ambition as a statesman. He lacked the intense conviction of a man like Cato, and he lacked also the cool, haughty courage and unshaken nerve of Cæsar. He always saw with fatal facility the strength of each side of every question, so that he was continually wavering between one position and another, swayed by the impulses of the moment and utterly devoid of that grim tenacity of purpose which holds fast to the end. This is the reason why, in the stormy times which attended and followed the death of Cæsar, Cicero hesitated and temporized and so miscalculated the attitude and the intentions of the conflicting parties that, in the end, both of them conceived for him an enmity mingled with contempt. See ANTONIUS; AUGUSTUS; CÆSAR; POMPEIUS.

In his oratory Cicero represents a mean between the Attic simplicity of Demosthenes and the so-called "Asiatic" floridity of his own former rival, Hortensius. Ancient rhetoricians classified him as belonging to the Rhodian school of eloquence. He had, indeed, all the gifts of nature and of training which go to make the perfect orator—an impressionable nature, a vivid imagination, and a mastery of language such as has never been surpassed. The one defect in Cicero's oratory is the defect that has been already noted in his character, and which may be defined as a lack of sincerity, of genuine conviction, of the ring of truth. This strain of insincerity makes him almost always seem to be

the special pleader who praises or denounces, as the case may be, more from a certain sympathetic facility for working up a temporary interest in almost any cause, than from the impelling force of a master mind which takes its stand upon the rock of principle, from which neither self-interest nor flattery nor danger can shake it free. Hence there is nothing in all Cicero's oratorical effort worthy to be set beside the one sublime masterpiece of Demosthenes without appearing by comparison light and hollow and almost trivial. This defect, however, is wholly moral and psychological. On the linguistic side it is impossible to set Cicero's rank too high. The perfect harmony of his periods, the exquisite choice of his words, the delicate balance of his cadences, whose sound keeps up an ever-running accompaniment to sense, and the majestic roll of his wonderful perorations are absolutely without counterpart in Greek, or English, or any other language whatsoever, and they make reasonable and true the judgment of Quintilian, that "Cicero is now less the name of a man than of eloquence itself."

As a man of letters Cicero has also left to posterity a mighty name. He created a prose style which for richness and refinement has never been surpassed, and which became at once the standard by which all other Latin prose is now tested and compared. He added, indeed, very largely to the vocabulary of his own language, giving currency to striking and picturesque words and phrases which had hitherto not entered into the diction of formal literature, but which were exceedingly expressive, and needed only the authority of a genius like Cicero to gain universal currency. Likewise, when necessary, and especially when paraphrasing in Latin the philosophical writings of the Greeks, he struck out new words to express new ideas, and these newly minted words were so thoroughly in accordance with the analogies of the Latin language as to be at once accepted and approved. Cicero was a facile writer, and he dealt with many subjects in many departments of intellectual interest. Nearly all of his philosophical books were borrowed almost wholly from Greek sources and are therefore entirely unoriginal in matter; but the manner is most attractive and has a lucidity and grace such as the Greek philosophical writers seldom attained. They have been of great service to the modern world, because they have preserved much of Greek philosophy otherwise unknown to us or known only imperfectly. His rhetorical works, written in the dialogue form, are of great value, first as being the production of one who was himself an accomplished rhetorician, and in the second place for the richness of the historical material which Cicero scattered through them with a lavish hand. Among the minor works of Cicero two, a treatise on old age (*De Senectute*) and one on friendship (*De Amicitia*), have always been admired, both for their exquisite charm of style and for their urbane and cultivated tone. Highly important among the Ciceronian remains are four collections of letters written by Cicero to various acquaintances and friends, and numbering in all 774 pieces; there are, besides, 90 letters addressed to Cicero. These letters were not collected by Cicero himself, nor did he ever intend that they should be published. They represent, therefore, an unstudied, unconscious, spontaneous self-revelation of their author, and they are, besides, an inexhaustible treasure house of information, often of a very intimate character, concerning Cicero's contemporaries and the political history of his time. This correspondence was preserved and edited by Cicero's amanuensis, Tullius Tiro, and also in part by Cicero's familiar friend, Pomponius Atticus, to whom very many of the letters were addressed. Cicero likewise, in his early years, composed poetry, little of which has survived and none of which was favorably judged by his own countrymen.

The extant orations of Cicero are 57 in number, of which the most famous are the four against Catiline, the 14 so-called Philippics against Antony, the oration on behalf of Archias, and two legal orations, one on behalf of L. Murena and the other on behalf of Marcus Cælius. It should be remembered always in reading these orations that they are not now in the actual form in which they were delivered, but that Cicero edited them freely, as Webster edited his famous speech in reply to Hayne. Some of the Ciceronian orations, in fact, were not delivered at all, and this was especially the case with most of the Philippics, which were in reality political tracts or pamphlets. Of the speeches which have been mentioned above, the first oration against Catiline is the most highly wrought and splendidly rhetorical; the one in behalf of Archias is the most graceful, easy, and refined; the two legal orations are the neatest and wittiest; the second Philippic is the most elaborately violent in the severity and at times the coarseness of its denunciation.

The best complete text edition of Cicero's works is that of Müller (Leipzig, 1878 ff.). A new text is under way in the *Oxford Classical Text Series*. The best edition of the letters with a commentary is that of Tyrrell and Purser (6 vols., London, 1885–99). For excellent editions of other works, consult Reid, *Academica* (London, 1885); Wilkins, *De Oratore* (Oxford, 1888–92); Sandys, *Orator* (Cambridge, 1892); Mayor, *De Natura Deorum* (Cambridge, 1883–1891); Seyffert-Müller, *Laelius* (= *De Amicitia*, Leipzig, 1876). The letters are translated by Shuckburgh (London, 1899) and by Winstedt (London, 1912–14). There are no good translations into English of the rest of Cicero's works. There is a German lexicon to the philosophical writings (1895) and to the orations (1884), both by Merguet. On Cicero's language and style, see especially Norden, *Die Antike Kunstprosa* (Leipzig, 1898); Lebreton, *Etudes sur la langue et la grammaire de Cicéron* (Paris, 1901). For a general discussion of his writings, consult Duff, *A Literary History of Rome*, pp. 349–397 (New York, 1909). For rhythm in Cicero, a subject which he makes much of in his rhetorical writings, consult Th. Zielinski, *Das Clauselgesetz in Ciceros Reden* (Leipzig, 1904); F. W. Shipley, "The Heroic Clausula in Cicero and Quintilian," in *Classical Philology*, vi, 139–156 (1911); Shipley, "The Treatment of Dactylic Words in the Rhythmic Prose of Cicero," in *Transactions of the American Philological Association*, xli, 139–156 (1910); Shipley, "Preferred and Avoided Combinations of the Enclitic *Que* in Cicero," in *Classical Philology* (1913). For an account of Cicero's career, see Middleton, *Life of Cicero* (London, 1741), very old-fashioned and extreme; Forsyth, *Life of Cicero* (London, 1864); Strachan-Davidson, *Life of Cicero* (New York, 1894); and Boissier, *Cicéron et ses amis* (5th ed., Paris, 1895). An uncritical but

interesting book is Trollope, *Life of Cicero* (New York, 1880). For an unfavorable view of Cicero, see Mommsen, Eng. trans., *History of Rome*, vol. iv (New York, 1886), while the strongest plea for Cicero is that of Gerlach (Basel, 1864). On Cicero as a philosopher, consult Levin, *Lectures on the Philosophy of Cicero* (Cambridge, 1871), and the introduction to Reid's edition of the *Academica;* on his legal merits, Gasquy, *Cicéron jurisconsulte* (Paris, 1884); on his rhetorical and oratorical gifts, Causeret, *Sur la langue de la rhétorique dans Cicéron* (Paris, 1886), and the introduction to Wilkins's edition of the *De Oratore* and that to Sandys's edition of the *Orator;* Thiele, *Hermagoras* (Berlin, 1893); and Sears, *History of Oratory* (Chicago, 1896). Regarding the letters of Cicero, consult Nisard, *Notes sur les lettres de Cicéron* (Paris, 1882), and the introduction to Tyrrell and Purser's edition, in vol. i. An important work on Cicero by E. G. Sihler is soon to be published.

CICERO, QUINTUS TULLIUS (c.102–43 B.C.). A Roman commander, younger brother of Cicero, the orator. He served as prætor in 62 B.C., and was governor of Asia for three years. As legatus he accompanied Cæsar to Britain in 55 B.C. He commanded a legion in winter quarters in 54 B.C., and showed skill and courage in defending his camp against vast forces of the Gauls under Ambiorix (q.v.). In 51 he served as legate to his brother, Marcus Tullius, in Cilicia. After the battle of Pharsalus, in which he had fought on the side of Pompeius, he was proscribed by the triumvirs and put to death by the emissaries of Antonius. Quintus was perhaps the author of the *Commentariolum Petitionis*, a missive addressed to his brother and usually printed with Cicero's letters to him, and of several tragedies, which have been lost. Eighteen lines by him are printed in Bücheler, *Quinti Ciceronis Reliquiæ* (Leipzig, 1869). Consult "The Commentariolum Petitionis ascribed to Quintus Cicero," in *Chicago University Decennial Publications*, vol. vi (1903).

CICERONE, sĭs'ê-rō'nê, *It. pron.* chē'châ-rō'-nâ (It., from *Cicero*, on account of his learning or eloquence). A guide, usually for the purpose of showing strangers the curiosities and works of art in a town. Ciceroni are of all degrees, from distinguished archæologists, who undertake the office as a favor, to the humble *guide-interprête.*

CICHORIUM, sĭ-kō'rĭ-ŭm. See CHICORY.

CICINDELIDÆ, sĭs'ĭn-dĕl'ĭ-dē. See TIGER BEETLES.

CICISBEO, chē'chês-bā'ô (It., whence Fr. *cicisbée, sigisbée*, probably from Fr. *chic*, Sp. *chico*, small + *beau*, It. *bello*, beautiful; i.e., a minor gallant). A name given in Italy to the professed gallant or constant attendant upon a married lady. In the higher ranks of Italian society it was at one time considered unfashionable for the husband to associate with his wife anywhere save in his own house. In society or at public places of amusement the wife was accompanied by her cicisbeo, who attended at her toilet to receive her commands for the day. This custom, which was once universal and which naturally gave rise to much scandal, has now almost disappeared. Cicisbeo is synonymous with *cavalière servente.* See Byron's poem *Beppo.*

CICOGNARA, chē'kô-nyä'rà, LEOPOLDO, COUNT (1767–1834). An Italian archæologist, art historian, and painter. He was born in Ferrara, studied in Modena under Vestri and in Rome under Cannucini, and became successively Ambassador of the Cisalpine Republic to Turin and a Councilor of State. In 1808 he left the government service and became president of the Academy of Fine Arts in Venice. He traveled extensively and made valuable collections of art objects and works on art history. His chief publication is the *Storia della scultura dal suo risorgimento in Italia sino al secolo di Napoleone* (3 vols., 1813–18; 2d ed., 7 vols., 1824), a critical study of remarkable completeness and accuracy, which obtained for him a European reputation. Consult: Becchi, *Elogio di Leopoldo Cicognara* (1834); Zanetti, *Cenni biografici di Leopoldo Cicognara* (Venice, 1834); and Callari, *Storia dell' arte contemporanea italiana* (1909).

CICONI, chē-kō'nê, TEOBALDO (1824–63). An Italian dramatist, born in San Daniele (Friuli). He studied in Padua, and in 1848 participated in the insurrection in Tuscany, Venice, and Rome. His comedy *Le pecorelle smarrite* (1857) was his first important popular success. Other dramatic works, such as *Le mosche bianche* and *La rivincita*, confirmed his reputation. He was a clever journalist and wrote lyrics with some success.

CID, THE, or **CID CAMPEADOR,** *Sp. pron.* thĕD käm'pâ-â-dōr' (Sp., Lord Conqueror). The name given in histories, traditions, and songs to the most celebrated of Spain's national heroes. There is so much of the mythical in the history of this personage that hypercritical writers, such as Masdeu, have doubted his existence; but recent researches, more particularly those of Dozy, and the investigation of newly discovered Arabic sources, have succeeded in separating the historical from the romantic. The following is the result of these inquiries: Rodrigo or Ruy Diaz (Roderic the son of Diego), generally known as Ruy Diaz de Bivar, was descended from one of the proudest families of Castile. His name first appears in a document written in 1064, during the reign of Ferdinand the Great of León. Under Sancho II, son of Ferdinand, he became standard bearer and commander of the royal troops. In a war between the two brothers, Sancho II and Alfonso VI of León, it was a stratagem of Roderic's—which, according to modern notions, was anything but honorable—that secured the victory of Sancho at Llantada over his brother, who was forced to seek refuge with the Moorish King of Toledo (1071). He appears at this time to have already been called the *Campeador*, a word supposed to answer to our "champion."

Upon the assassination of his friend and patron, King Sancho, he required the next heir, Alfonso, to clear himself by oath of any participation in his brother's murder ere the nobles of León and Castile should do homage to him. By this act he incurred the new monarch's enmity; an enmity which, however, the politic King concealed in the hour of danger, even consenting to Roderic's marriage with his cousin Ximena, daughter of Diego, Count of Oviedo. But when the King thought the services of Roderic no longer necessary to his own safety, he lent a willing ear to the latter's personal enemies, and banished him in 1081. Roderic then joined the Moorish King of Saragossa, in whose service he fought against both Moslems and Christians. He frequently defeated the King of Aragón and the Count of Barcelona, the latter of whom, Berenguer Ramón II, he took prisoner.

He was again reconciled to the King, but only for a short time, when he was condemned to a

second exile. In order to support his family and numerous followers, he now saw himself forced to carry his sword against the Moors, over whom he gained a victory, and established himself as sovereign or lord of Valencia (1094). He retained possession of Valencia five years, during which time he took many neighboring fortresses. The Cid, with only his own lance and his small band of faithful followers, had made better headway in the reconquest of Spain from the Moors than had Alfonso with the powerful Kingdom of Castile to support him; and not only Spain, but the rest of Christendom knew it. The doughty warrior died of grief in 1099, on learning that his relative and comrade in arms, Alvar Fañez, had been vanquished by the Moors, and that the army which he had sent to his assistance had been defeated near Alcira. After the Cid's death his widow held Valencia till 1102. When at last she was obliged to capitulate to the Almoravides, and flee to Castile, where she died in 1104, she set fire to the city, and took with her the embalmed body of the Cid, mounted on his war horse Babieca. So ran a legend that gained currency some time after the event. As a matter of fact, Ximena, after holding the city for nearly three years, was obliged to call upon her cousin the Emperor for aid. He went with a strong army, but having no man able to hold the city, he set fire to it, took Ximena with him, and carried away the remains of the Cid, surrounded by his former vassals as a guard of honor. Ximena's remains were placed by those of her lord in the monastery of San Pedro de Cardeña, near Burgos. We have no historical evidence in support of the Santiago Genealogía and Crónicas which state that the Cid had a son, who was slain by the Moors in a battle near Consuegra in 1081. But he did leave behind him two daughters, one of whom was married to the Count of Barcelona, the other to the Infante of Navarre, through whom the kings of Spain claim kindred with "*Mio Cid el Campeador*," as do also the British royal family (through Eleanor of Castile), and the French Bourbons and the Hapsburgers. Relics of the "Blessed Cid," as he is still called in Spain, such as his sword, shield, banner, and drinking cup, are still held in great reverence by the populace.

About 1140, hence only about 40 years after the Cid's death, a poem was composed in his honor, the *Poema del Cid*, also called the *Cantar de Mio Cid*. This is the oldest of the great Spanish epics that has reached us practically complete. It has survived in a single manuscript, which is incomplete at the beginning; but from other sources we know practically what the missing part contained and about how long it was. As we have it the *Poema* amounts to 3735 verses, which compares favorably in length with the 4001 verses of the *Chanson de Roland*. It has a unity of composition and spirit which makes it evident that the poem is not a pastiche of many smaller poems more or less dexterously woven into one, but that it is one great composition, carefully thought out and planned so that the various parts balance properly. It represents the Cid as immutably faithful to an unjust sovereign. It has been thought by some that the character of the Cid of the *Poema* is largely antihistorical. This is true only in part. And yet the unknown poet who gave us this masterpiece was dexterous enough to create a type of character which, although in some respects antihistorical, none the less so thoroughly harmonizes with the spirit of the nation that the type which he created, and not the rigidly historical type, has become the universally accepted type for the Spanish national hero. Most epic poems contain a vast amount of the supernatural or the marvelous. The only supernatural incident in the *Poema* is the consoling dream in which the angel Gabriel appears and promises success the night before the Cid leaves Christian territory and enters the land of the enemy; and the incident is related in eight verses. And the marvelous is entirely absent from the account of the deeds of valor of the various knights in the Cid's band. English readers are fortunate in possessing more than one English rendering. John Hookam Frere, sometime British Minister to Spain, made a verse translation of six passages, prefacing each one with a brief synopsis of what leads up to the selection. Later John Ormsby made a condensed translation in prose of the less poetic passages, and a ringing verse translation of all the others. In 1901 Archer Milton Huntington published a complete line for line translation, the merits of which vary in accord with the merits of the original. The numerous Cid romances that were first published in the sixteenth century contain the most romantic improbabilities concerning the life and deeds of the Cid. Consult *Silva de varios romances* (1550) and *Romancero general* (1604). These romances were taken from the ancient *cantares* (national songs) and *poemas*, most of which are entirely lost.

The most important of modern works on this subject are: Dozy, *Recherches sur l'histoire politique et littéraire de l'Espagne pendant le moyen âge* (3d ed., Leyden, 1881); Huber, *Geschichte des Cid*, etc. (Bremen, 1829); Southey, *Chronicle of the Cid* (London, 1808); Willemaers, *Le Cid* (Brussels, 1873); Milá y Fontanals, *De la poesía heróico-popular castellana* (Barcelona, 1874); Menéndez Pidal, *Cantar de Mio Cid: texto, gramática y vocabulario* (3 vols., Madrid, 1908–11); Huntington, *Poem of the Cid* (text, translation, and notes, 3 vols., New York, 1897–1903; popular edition with same contents except for illustrations, 3 vols., New York, 1909); Fitzmaurice-Kelly, *Chapters on Spanish Literature* (London, 1908); B. P. Bourland, *El Cantar de Rodrigo* (in *Revue Hispanique*, 1911, vol. xxiv, pp. 310–357); *El Cantar de Rodrigo* (facsimile reproduction of the MS. in the Bibliothèque Nationale, edited by Archer M. Huntington, New York, 1904); Menéndez Pidal, *L'Epopée castillane à travers la littérature espagnole* (Paris, 1910); Menéndez Pidal, *El Romancero español* (The Hispanic Society of America, 1910); H. Butler Clarke, *The Cid Campeador, and the Waning of the Crescent in the West* (London, 1902); and for the translations, other than Huntington's, mentioned above, John Hookham Frere, *Works* (2d ed., London, 1874), and John Ormsby, *The Poem of the Cid* (London, 1879).

CID, Le. A famous tragedy by Pierre Corneille (q.v.).

CID, Le. An opera by Massenet (q.v.), first produced in Paris, Nov. 30, 1885; in the United States, Feb. 12, 1897 (New York).

CID'ARIS. A genus of sea urchins (q.v.).

CI'DER (from OF. *cidere*, from Lat. *sicera*, from Gk. *σίκερα*, *sikera*, from Heb. *shēkār*, strong drink, from *shākar*, to be intoxicated). The sweet or fermented juice of apples, and some-

times other fruits, as pears (perry cider), oranges, etc., used as a beverage and for making vinegar. The apples are first ground or grated in a mill, and the pulp is then made into a cheese by mixing with straw to hold it in shape, or in some cases is placed in forms made of reed grass. It is then subjected to pressure, and yields a dark-colored sweet liquid. The pomace remaining is sometimes wet and pressed again, yielding an inferior cider. Green or rotten apples should not be used; the former make cider deficient in sugar and turbid from the suspended particles of starch, while rotten fruit is sure to impair the flavor of the cider. Early apples make a much poorer quality of cider than do fall and winter apples, as the latter contain about 2.5 per cent more of sugar. Fresh cider contains 85 to 88 per cent of water, 12 to 15 per cent of total solid matter, consisting mostly of sugar, and a little malic acid, the natural acid of the apple. The "working" or fermentation of cider, by which alcohol is produced, is due to certain kinds of yeasts, which decompose the sugar into alcohol and carbonic acid, the latter passing into the air. In some countries pure cultures of yeasts are, with advantage, now employed for the fermentation. After the first or main fermentation the clear liquid is racked off into clean casks which are placed in a cool cellar for the second or still fermentation. An acetic fermentation may take place by which acetic acid is produced and the cider becomes "hard," or quite sour, unless properly handled. The fermented cider contains only 2 or 3 per cent of solids (instead of 12 to 15 per cent as in the apple juice) and from 4 to 8 per cent of alcohol. By again racking off the cider, after the second fermentation, and placing it in casks tightly bunged or in closely stoppered bottles, it can be kept for a considerable time without souring.

Cider brandy, or applejack, is a product derived by distillation from fermented cider. It contains very much more alcohol. For cider vinegar, see VINEGAR.

CIÉNEGA, sē-ā'nā-gȧ, *Sp. pron.* thē-. A name used in the Southwest for swamp (q.v.).

CIÉNEGA (lagoon, Sp. form Ciénaga), or SAN JUAN DE LA CIÉNAGA. A town in the Department of Magdalena, Colombia, at the mouth of a lagoon on the northwest coast, 10 miles south of Santa Marta, with which it is connected by rail. Its inhabitants, estimated at 7000, are chiefly engaged in fisheries.

CIENFUEGOS, syĕn-fwā'gōs (Sp., hundred fires), or JAGUA. A city of Cuba, in the Province of Santa Clara, situated on the south coast, about 190 miles southeast of Havana (Map: Cuba, E 4). Cienfuegos has one of the finest harbors in the world, inclosing an area of about 6 square leagues, with a depth of 27 feet at the anchorage. The city's streets are wide and straight, and one of the plazas is considered the finest in the island. Cienfuegos is lighted by gas and electricity, and has a good water supply. Its commerce is largely with the United States, the principal exports being sugar, molasses, cacao, and tobacco. Cienfuegos is connected by rail with Havana and a few other important points. The harbor is supposed to have been visited by Columbus on his first voyage, but the first settlement was made by refugees from Santo Domingo in 1819. During the Spanish-American War the port was blockaded by Admiral Schley, then in search of Cérvera's fleet. Pop., 1899, 30,038; 1907, 30,100; of municipal district in 1907, 70,416.

CIENFUEGOS, NICASIO ÁLVAREZ DE (1764–1809). A Spanish poet and publicist. He was born in Madrid, was educated at Salamanca, and published his first collection of poems in 1798. The editorship of the government journals *El Mercurio* and *La Gaceta* was granted him the same year, and subsequently he obtained an appointment in the Foreign Office. For participation in the popular demonstration against the French at Madrid on May 2, 1808, and an article against Napoleon, he was condemned to death; but on petition of some powerful friends the sentence was changed and he was deported to France, where he died. His dramas are to later taste stilted and ill contrived, on the pseudo-classic French model, and yet he was the most original of the writers who towards the end of the eighteenth century tried to reform the Spanish drama, and it was his *Pitaco* that won him his election to the Royal Academy. His lyric verse, however, is still read. An edition of his *Obras poéticas* appeared at Paris in 1821 (2 vols.). His dramas were collected and issued at Barcelona, 1836. Consult: "Poesías," in *Biblioteca de Autores Españoles,* vol. lxvii; Piñeyro, "Cienfuegos," in *Bulletin Hispanique,* vol. xi (Bordeaux, 1909).

CIESZKOWSKI, tsĕ'ȧsh-kŏv'skē, AUGUST, COUNT (1814–94). A Polish philosopher and political economist, born at Sucha, Podlachia, and educated at the University of Berlin. He was one of the founders of the *Biblioteka Warszawska,* and in 1848 settled in Posen, whence he was for years sent as a deputy to the Prussian Chamber of Deputies. He was president of the Society of the Friends of Science in Posen, and repeatedly, but vainly, endeavored to bring about the establishment of a university in that city. In 1872 he became a member of the Cracow Academy. In philosophy he was an anti-Hegelian, and wrote against the pantheistic system of that German philosopher, developing his own supernaturalistic theories concerning God, the immortality of the soul, and the divinity of Christ. His works, written in German, French, and Polish, include the following: *Prolegomena zur Historiosophie* (1838); *Gott und Palingenesie* (1842); *De la patrie et de l'aristocratie moderne* (in French, 1844); *Du crédit et de la circulation* (2d ed., 1847); *Ojcze-Nasz* (1848), a philosophical exposition of the Lord's Prayer; *O drogach ducha* (1863 and 1869).

CIEZA, thē-ā'thȧ. A town of Spain, in the Province of Murcia, situated on the left bank of the Segura, 26 miles northwest of Murcia (Map: Spain, E 3). It lies in a fertile region, amid olive groves, and contains several chapels and hermitages, in addition to the parish church. In its vicinity are the ruins of an old Roman fortress. Pop., 1900, 13,590; 1910, 14,393.

CIEZA DE LEÓN, thē-ā'thȧ dā lā-ōn', PEDRO DE (1518–60). A Spanish soldier and historian, born in Llerena. He accompanied Pizarro, and up to 1552 fought much and traveled widely. He wrote a *Crónica del Perú* (in four parts), a valuable authority on the geography and early history of Peru, as well as on Peruvian civilization under the Incas. For this work, imperfectly edited as it is, the Royal Academy included Cieza de León in the official *Catálogo de las autoridades de la lengua.* Parts i and ii of his narrative have been translated

into English by Sir Clements R. Markham for the Hakluyt Society. Cieza wrote two other works: *Libro de las cosas sucedidas en las provincias que confinan con el mar Océano,* and *Historia de la Nueva España.*

CIGAR, CIGARETTE. See TOBACCO.

CIGARETTE BEETLE. A small ptinid beetle (*Lasioderma sericorne*), closely related to the deathwatch, which attacks stored tobacco. It is a great pest in tobacco warehouses in both Europe and America. See TOBACCO PESTS.

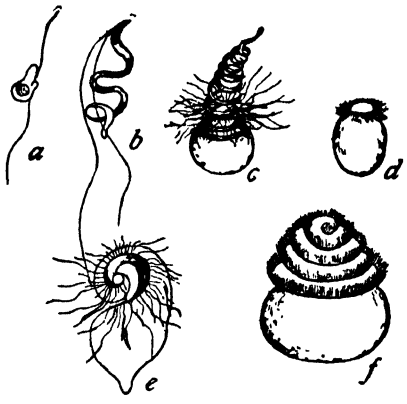
CIGAR FISH. See SCAD.

CIGNANI, chē-nyä'nē, CARLO, COUNT (1628–1719). An Italian painter, born in Bologna. He was the pupil of Francesco Albani, whose influence is visible in such earlier works as the frescoes in the Palazzo Pubblico, Bologna. Later he was influenced by the Carracci, Correggio, and Guido Reni, as may be seen in his frescoes in Rome. His masterpiece is the "Assumption of the Virgin," a fresco in the dome of the cathedral of Forli, on which he worked twenty years; his best oil paintings are "Joseph and Potiphar's Wife" (Dresden), and "Pera and Cimon" (Vienna). Cignani is the most important representative of the later baroque painting in Italy. Consult Frati, *La Familia Cignani* (Rome, 1910), and Riegl, *Die Entstehung der Barockkunst in Rom* (Vienna, 1908).

CIGOLI, chē'gō-lē, LUDOVICO C. DI (1559–1613). A Florentine painter and architect. He was born in Castelvecchio and was a pupil of Allessandro Allori, Buontalenti, and later of Santo di Tito. Cigoli was influenced by the different tendencies which mark a transitional stage of art, and his works vary in style. Good examples of his earlier period are frescoes in the cloisters of Santa Maria Novella, Florence (1581), and the "Martyrdom of St. Stephen" (Florence Academy, 1587). The "Awakening of Lazarus" (1592) and numerous pictures of the life of St. Francis (Museo di San Marco) show much progress, and the "Miracle of St. Anthony" (Cortona, 1597) is entirely free from the traditions of the Mannerists, and in the new baroque style. He was employed by Pope Paul V in various works in Rome and painted for St. Peter's a fresco which is now destroyed and an "Ecce Homo." His best paintings in Rome are "Joseph and Potiphar's Wife" (Borghese Gallery), and the frescoes of "Cupid and Psyche" (Palazzo Rospigliosi, 1613). Cigoli was the originator of baroque (q.v.) painting in Florence. Among his pupils was Christoforo Allori (q.v.). Consult Busse, *Manierismus und Barockstil* (Leipzig, 1912).

CILIA, sĭl'ĭ-ȧ, OF PLANTS (Neo-Lat. nom. pl., from Lat. *cilium,* eyelid). The cilia of plant cells are exceedingly delicate protoplasmic fibrils, whose rapid vibratile movement in the water propels the body. Some of the lowest unicellular algæ (Volvocales, see ALGÆ) are provided with cilia, generally a pair for each cell, throughout the entire vegetative life of the organism. But in the higher algæ and some fungi this motile condition is only present in reproductive cells, as swarm-spores (zoöspores, q.v.), and motile sexual cells (gametes). The ciliated cell is represented in groups above the algæ and fungi (thallophytes) only by the motile sperms, characteristic of the mosses and ferns. It makes its last appearance in the cycads and certain other primitive gymnosperms.

Cilia are developed from cytoplasmic elements in the protoplasm (see CELL), and in some types are known to be formed by a definite protoplasmic body termed a "blepharoplast" (q.v.), which is probably related to the structure generally called a "centrosphere."



CILIA.

a, Sperm of Alga; *b,* sperm of Chara; *c,* sperm of Marsilea; *d,* spore of Œdogonium; *e,* sperm of fern; *f,* sperm of cycad.

CILICIA, sĭ-lĭsh'ĭ-ȧ (Lat., from Gk. Κιλικία, *Kilikia,* Assyr. *Khilakku*). An ancient country occupying the southeastern portion of Asia Minor (Map: Turkey in Asia, E 4). The Taurus Range, which separated it from Cappadocia and Lycaonia, bounded it on the north, the Gulf of Issus and the Cilician Sea on the south, while the Amanus Mountains and Pamphylia bounded it respectively on the east and the west. It was watered by the Pyramus, Sarus, and Calycadnus. The eastern portion of Cilicia was fertile in grain, wine, etc.; while the western and more mountainous portion furnished to the ancients inexhaustible supplies of timber. The passes into Syria are easy of access, but those through the Taurus are very difficult, the easiest being the "Cilician Gates," through which Cyrus the Younger and Alexander the Great entered the country. The chief city was Tarsus.

The early inhabitants of Cilicia appear to have been of Semitic stock. At the time of the rise of the Persian monarchy the country was ruled by a native dynasty bearing a title or name which the Greeks reproduced as Syennesis. These princes became vassals of the Persian kings. In the period of Greek rule in the East Cilicia became the seat of dreaded pirates. When they carried on their depredations too close to the shores of Italy, the Roman arms were turned against them, and they were subdued by Pompeius (67 B.C.), and Cilicia was made a Roman province (64 B.C.), though the mountainous western portion was never thoroughly subjugated.

CILICIAN (sĭ-lĭsh'ȧn) **GATES.** The ancient name of a pass through the Taurus from Cappadocia to Cilicia. The city of Tyana was situated at the northern foot of the Taurus, at the Cappadocian opening of the pass.

CILLI, tsĭl'lē. The capital of a district in Styria, Austria, picturesquely situated amid hilly scenery on the Sann, 38 miles northeast of Laibach (Map: Austria, D 3). The town is of great antiquity, and with the remains of its fortified walls and castle, containing the throne of the counts of Cilli, gabled houses, a Romanesque church, Gothic chapel, and fourteenth-century parish church, retains a mediæval aspect. The municipal museum contains numerous Ro-

man antiquities and relics of the town's early history. It is an increasingly popular summer resort, owing to the warm river baths at Neuhas 10 miles distant. Coal and iron mines, smelting furnaces, chemical works, furniture, leather, and pottery manufactories are among its chief industrial establishments, and there is an extensive trade carried on in coal, iron, zinc, timber, cereals, cattle, leather, and wine. The Roman Colonia Claudia Celeja, mentioned by Pliny the Elder, was taken by the Emperor Claudius 15 B.C. and subsequently formed part of Aquileia. It was the capital of the Slavonian District of Zellia from 1146 to 1331, and from 1339 to 1456 of the County of Cilli. Pop., 1890, 6264; 1900, 6743.

CIMA, chē'mȧ, GIOVANNI BATTISTA, called DA CONEGLIANO (c.1459–1517). A Venetian painter of the Renaissance. He was born in Conegliano and probably studied with Alvise Vivarini, or, according to others, with Giovanni Bellini, who undoubtedly influenced his earlier works. Many of these represent the "Madonna with Saints," good examples of which are in the Museo Civico, Vicenza, the Brera, Milan, the cathedral at Conegliano, and the galleries of Bologna, Venice, Vienna, Munich, and Berlin. "The Healing of Ananias" (Berlin Museum, 1499), "Annunciation" (Hermitage, St. Petersburg), "David and Jonathan" (National Gallery) are also deserving of mention. But Cima's best work corresponds to the great change of style in Venetian painting, induced especially by Giorgione. To this period belong "The Baptist with Four Saints" (Santa Maria dell' Orte, Venice); "Adoration of the Shepherds" (Santa Maria del Carmine, ib.); "Tobias with the Angels" (Venice Academy); "Madonna" (Louvre); and his masterpiece "The Glorification of St. Peter, Martyr" (Brera, Milan). He is represented in the Metropolitan Museum, New York, by "Saints Anthony, Roche, and Lucy." Cima was a conservative, whose art marks the close of an era rather than transition. But while preserving his own individuality he sought to adopt the ideas of the younger generation. His pictures are naïve, fresh, joyous, and free from affectation. Consult: Berenson, *Venetian Painters of the Renaissance* (New York, 1894); the biographies by Botteon e Aliprandi (Conegliano, 1893) and Burckhardt (Leipzig, 1905); Richter, *The Mond Collection* (London, 1910).

CIMABUE, chē'mȧ-bōō'ȧ, GIOVANNI, properly Cenni di Pepo (?–c.1302). A Florentine painter and mosaicist, the greatest of his day, and the first to break the Byzantine tradition. The traditional account of his life, based upon the narrative of Vasari, has been critically analyzed by modern authorities with reference to the sources from which it was drawn, and has proved almost entirely untrustworthy. The name Cimabue is not that of a noble Florentine family (as Vasari thought), but a nickname meaning "bull's head." The only reliable data of his life are gleaned from contemporary documents. It is of course probable that he was born and spent the greater part of his life in Florence, and that he studied there with native or imported masters of the Byzantine school. He was certainly active in Rome where he attested a document in 1272. In Pisan documents he is recorded as chief master of the mosaics of the apse of the cathedral in 1301–02, and as having painted an altarpiece of the Madonnas for Santa Chiara, Pisa. In 1302 he is likewise mentioned in Florentine documents as being a member of a guild in Pisa, and it is probable that he died soon after this. The painting by which he was most widely known was the "Madonna" which, according to Vasari, Charles of Anjou visited in state, and which was carried in triumphal procession to its place in the Rucellai Chapel, Santa Maria Novella, Florence. But recent criticism has shown that this painting is not Florentine but Sienese in manner and was probably the work of Duccio (q.v.), who we know painted a Madonna for Santa Maria Novella in 1485. The well-known Madonna in Paris is probably an atelier piece, and the example in London is not by him, but a Sienese painting of the early fourteenth century. His only work authenticated by documentary evidence is the mosaic figure of St. John in the apse of the Pisa Cathedral; but there are several paintings which authorities are agreed in assigning to him. They are: "The Madonna of Santa Trinità," now in the Academy of Florence; the "Crucifix of Santa Croce"; the frescoes in St. Francis of Assisi. In the decoration of this important church, whose frescoes are a museum of the painting of the later thirteenth and early fourteenth centuries, he took a very important part. He was possibly in charge of the decorations of the Upper Church, in which he painted the frescoes in the choir—five scenes from the life of the Virgin, others depicting St. Michael and the scenes from the Apocalypse, and the Crucifixion—the gallery of the left transept, and the four evangelists in the vaulting where the nave and transept cross. The other decorations of the left transept are either early paintings of Cimabue, or more probably the work of an assistant. He also painted an admirable "Madonna with Angels and St. Francis" in the Lower Church of Assisi. All these frescoes show the influence of the Roman school; they are also by far his best and most important productions.

From the above paintings, as well as from the celebrated contemporary passage of Dante (Purgatorio, xi, 94–96), and the testimony of subsequent Florentine authorities, it is certain that Cimabue was the most important painter of Florence, and the undisputed head of the school before Giotto. His art is a culmination of the tendencies which had been leavening Italian painting since the middle of the thirteenth century, rather than an innovation. Though thoroughly mediæval in their solemn majesty and hieratic splendor, his figures show incipient life and movement. They bear greater resemblance to actuality and are far more expressive than those of his predecessors. Consult: Strzygowski, *Cimabue und Rom* (Vienna, 1888); Thode, in *Repertorium für Kunstwissenschaft* (Stuttgart, 1890); Zimmermann, *Giotto und die Kunst Italiens im Mittelalter* (Leipzig, 1899); Langton Douglas, notes to his edition of Crowe and Cavalcaselle's *History of Painting in Italy* (London, 1903); A. Aubert, *Die malerische dekoration der San Francesco Kirche in Assisi* (Leipzig, 1907); Venturi, *La basilica di Assisi* (Rome, 1908); Frey's notes to his edition of Vasari (Munich, 1911).

CIMAROSA, chē'mȧ-rō'zȧ, DOMENICO (1749–1801). An Italian composer of operas, born as the son of a poor mason, at Aversa, near Naples. He studied music at the Conservatory of Santa Maria di Loreto, under Manna, Sacchini, Fenaroli, and Piccinni. His first opera, *Le stravaganze del conte* (1772), achieved fair

success, and in two years he had a reputation in all the leading theatres of Italy, having composed half a dozen operas, and surpassing in popularity all composers then living, Paisiello and Mozart among them. In 1779 his *L'Italiana in Londra* was given in Rome, and other operas followed in rapid succession. He accepted a call to go to St. Petersburg as composer, and conductor of the Italian opera, but the severe climate compelled him to leave this lucrative post after three years (1789–92). Vienna received him with distinguished honors, and *Il matrimonio segreto*, produced there, had remarkable success. In Naples it had an unprecedented run of 67 nights in 1793. Of the operas written subsequently, the most famous was *Le astuzie femminili* (1794). In 1799 he joined a secret revolutionary society in Naples; the plot was discovered, and Cimarosa was sentenced to death, but this decree was commuted to exile. He died suddenly in Venice, and his friends accused the government of poisoning him. However, an autopsy proved the allegation unfounded. In all, he wrote about 80 operas, of which number *Il matrimonio* has not entirely disappeared from the stage. The greater number are comic operas, which picture the lightheartedness and gayety of life of the last quarter of the eighteenth century. In his serious operas, such as *Gli Orazi e Curiazi* and *Artaserse*, Cimarosa displays some power of characterization, coupled with original orchestral effects, masterly handling of dramatic situations, and tragic force, fully equal to his rich vein of comedy. Besides these operas he also wrote 5 oratorios, 2 requiems, several masses, 10 dramatic cantatas, and numerous smaller vocal pieces. Consult P. Cambiasi, *Notizie sulla vita e sulle opere di Domenico Cimarosa* (Milan, 1901).

CIM'BRI. An ancient tribe of warriors, who, with the Teutones, were the first Germans that forced their way into Roman territory. We hear of them first in 113 B.C., when they moved south through the German forests, joined with other northern tribes, and wandered through Noricum and Illyricum. The Romans sent against them the consul Papirius Carbo, but he met with a signal defeat at Noreia (113 B.C.), and the road to Italy was left open to the enemy. Fortunately for Rome, the Cimbri chose to migrate to the Rhine, which they crossed, and proceeded southward to Gaul. By 109 they were again on the Roman boundaries, and Junius Silanus, who was sent against them, also suffered a defeat. His successors were no more fortunate; at Arausio (Orange), in 105, the Romans lost 80,000 troops. The news of this disaster created a panic in Rome. The constitution was disregarded, and Marius, the successful general in Africa, was made consul for five years, in the hope that he might crush the "Gallic" invaders. While he was gathering great forces, the hordes of Cimbri and Teutones poured into northern Italy. The skillful generalship of Marius now put an end to their depredations. The Teutones were crushed at Aquæ Sextiæ (Aix) in Transalpine Gaul (102 B.C.), and in the following year a fearful battle was fought with the Cimbri in the Campi Raudii, near Vercellæ (Vercelli), and the entire nomad race was annihilated. The men were killed or captured, and the women slew themselves and their children (101 B.C.). The name Cimbric Chersonese was given by the ancients to the peninsula of Jutland, which they regarded as the original home of the Cimbri.

CIMICIDÆ, sĭ-mĭs'ĭ-dē (Neo-Lat. nom. pl., from Lat. *cimex*, bug). The family of bugs represented by the bedbugs (genus *Cimex*). See BEDBUG.

CIMICIFUGA, sĭ'mĭ-sĭf'ū-gȧ (Neo-Lat., from Lat. *cimex*, bug + *fugare*, to rout, from *fugere*, to flee), or BUGBANE. An herb of the family Ranunculaceæ. Black snakeroot or black cohosh (*Cimicifuga racemosa*) is found in all the northern United States, and is much used in rural districts as a medicine, chiefly in the form of a decoction. It contains a crystalline principle, two resins and tannin, and has strong alterative and sedative properties. It is sometimes used in cases of dyspepsia, bronchitis, amenorrhœa, and certain other diseases. The medicinal dose of the officinal extract of cimicifuga is from one to five grains. See Plate of BLOODROOT, under SANGUINARIA.

CIMME'RIANS (Gk. Κιμμέριοι, *Kimmerioi*). 1. In Homer, a mythical people, living in the Far West, on the shores of the ocean, where the sun never shines and perpetual darkness reigns. 2. An historical people, whose country lay along the northern shore of the Black Sea, including the Tauric Chersonese. These latter at an early period made inroads into Asia Minor and laid waste the country. There were presumably several such incursions, but the accounts are confused. It was probably in the seventh century B.C. that they were driven from their homes by the Scythians and overran Asia Minor. They on this occasion plundered Sardis and destroyed Magnesia, but failed in an attempt on Ephesus, and were finally driven back by Alyattes of Lydia. See CALLINUS.

CIMOLITE, sĭm'ō-līt. See FULLER'S EARTH.

CIMON, sī'mŏn (Lat., from Gk. Κίμων, *Kimōn*) (c.500–449 B.C.). An Athenian commander, the son of Miltiades, the conqueror at Marathon. His first achievement was the paying of the fine imposed on his father for his proceedings at Paros. In conjunction with Aristides he was placed over the Athenian contingent to the allied fleet, which, under the supreme command of the Spartan Pausanias, continued the war against the Persians (477 B.C.). He effected the important conquest of Eïon, a town on the river Strymon, then garrisoned by the Persians. Later (c.466 B.C.), he encountered a Persian fleet of 350 ships at the river Eurymedon, destroyed or captured 200, and defeated the land forces on the same day. He drove the Persians from Thrace, Caria, and Lycia, and expended much of the money which he had obtained by the recovery of his patrimony in Thrace upon the improvement of Athens. At this period he appears to have been the most influential of the Athenians. The hereditary enemy of Persia, he made it his policy to advocate a close alliance with Sparta; and when the Helots revolted, he led an army upon two occasions to the support of the Spartan troops; but on the second occasion, having lost the confidence of his allies, he was ignominiously dismissed. After his return to Athens his policy was opposed by the democracy, headed by Pericles, who procured his banishment by ostracism (c.461 B.C.). He was presently recalled and was instrumental in obtaining a five years' armistice between the Spartans and the Athenians (c.450). He died in the year 449 B.C., while besieging the Persian garrison of Citium in Cyprus. For a translation of his life by Plutarch, consult Perrin, *Plutarch's Cimon and Pericles* (New York, 1910).

CINCHONA, sĭn-kō'nȧ (Neo-Lat., prop. *Chin-*





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1. CINCHONA TREES. 2. TAKING BARK FROM YOUNG TREE STEMS.

chona, from the Countess del Chinchón, wife of the Viceroy of Peru). An important genus of trees of the family Rubiaceæ. They yield the bark, so much valued in medicine, known as Peruvian bark, Jesuits' bark, china bark, quina, quinquina, cinchona bark, etc., from which the important alkaloids quinia or quinine and cinchonia or cinchonine are obtained. The properties of the alkaloids are astringent, tonic, antiperiodic, and febrifugal. The species of this genus are sometimes trees of considerable size; but, an aftergrowth springing from their roots when they have been felled, they often appear only as large shrubs, and some of them in the highest mountain regions in which they are found are low trees with stems only 8 or 10 feet in height. They exist naturally only in South America, between latitudes 20° S. and 10° N., and chiefly on the eastern slope of the second range of the Cordilleras. All the cinchonas, of which there are about 50 species, are evergreen trees, with laurel-like, entire, opposite leaves, stipules which soon fall off, and panicles of flowers which, in general appearance, are not unlike those of lilac or privet. The flowers are white, rose colored, or purplish, and very fragrant. The calyx is small and five toothed; the corolla tubular with a salver-shaped five-cleft limb. In the true *cinchona* the capsule splits from the base upward.

Great difficulty has been found in determining the species by which the different varieties of cinchona bark known in commerce are produced. The common commercial names are derived partly from the color of the barks, and partly from the districts in which they are produced, or the ports where they are shipped. It appears that calisaya bark, also called "royal" or "yellow" bark, one of the very best kinds—mostly shipped from Arica, Chile—is chiefly the produce of *Cinchona calisaya*, a large tree growing in hot mountain valleys of Bolivia and the south of Peru. Other kinds met with in the trade are crown, loxa, or pale bark, derived from *Cinchona officinalis* and its varieties; red bark, from *Cinchona succirubra;* Colombia bark, from *Cinchona cordifolia;* and pale bark from *Cinchona nitida* and *Cinchona micrantha*. Yellow bark is also produced by the variety ledgeriana of *Cinchona calisaya*. The varieties of this and *Cinchona succirubra* are the ones most met with in cultivation.

In South America the cutting and peeling of cinchona trees is carried on by Indians, who go in parties and pursue their occupation during the whole of the dry season. The trees were formerly felled as near the root as possible, that none of the bark might be lost. The bark, being stripped off, is carefully dried; the quilled form of the thinner bark is acquired in drying. The bark is made up into packages of various sizes, but averaging about 150 pounds weight, closely wrapped in woolen cloth, and afterwards in hides, to be conveyed on mules' backs to the towns. These packages are called "drums" or "seroons," and are exported in this form. At present less wasteful methods are employed, and the bark is removed so as not to destroy the trees. Strips of bark are sometimes removed and the wounds covered with moss, thus increasing the total yield.

A number of spurious kinds of Peruvian or cinchona bark are either sent into the market separately, or are employed for adulterating the genuine kinds. They are bitter barks and have, in greater or less degree, febrifugal properties, but are chemically and medicinally very different from true cinchona bark. They are produced by trees of genera very closely allied to *Cinchona*. While cinchona trees have been becoming every year more scarce in their native regions, little attempt has been made to cultivate them there, notwithstanding the constantly increasing demand for the bark; the Dutch have recently made extensive plantations of them in Java, and the same has been done in British India, from seeds and plants obtained from South America by Mr. Clements Markham. Cinchona is also cultivated extensively in Jamaica, Japan, Ceylon, etc. For the cultivation of cinchona a good soil and open subsoil are necessary. It seems to thrive best at a considerable elevation above the sea, where the temperature ranges from 55° to 65° F. It will endure slight frost or a temperature of 100° where shaded. In a wild state, the bark often contains 5 per cent or less of total alkaloids; but in cultivation, where only part of the bark is removed and the denuded area covered and kept moist, the young bark yields a much greater percentage of total alkaloids, a large proportion of which is quinine.

The Indians of Peru call the cinchona trees "kina," whence are derived the names "china," "quina," etc. It is not certain that they knew the use of the bark before the arrival of the Spaniards. It is a medicine of great value in the cure of intermittent fevers, etc., and diseases attended with much febrile debility; also in certain forms of neuralgia, and other diseases of the nervous system. It seems to have been first imported into Europe in 1639 by the Countess del Cinchón or Chinchón, the wife of the Viceroy of Peru, who had been cured of an obstinate intermittent fever by means of it. The Jesuit missionaries afterward carried it to Rome, and distributed it through their several stations, and thus it acquired the name of "Jesuits' bark." Cardinal Juan de Lugo having been particularly active in recommending and distributing it, it was also known as "Cardinal de Lugo's powder." It attained great celebrity in Spain and Italy, being sold at high prices by the Jesuits, by whom it was lauded as an infallible remedy. Its mode of action not being well understood, and the cases to which it was applicable not well defined, it seems, in the first instance, to have been employed without due discrimination, and to have fallen very much into the hands of empirics. Falling into disuse in Europe, it was again brought into notice by Sir Robert Talbor, or Talbot, an Englishman, who brought it to England in 1671 and acquired great celebrity through the cure of intermittent fevers by means of it, and from whom Louis XIV purchased his secret in 1682. A pound of bark at that time cost 100 louis d'or. Talbor seems to have had the acuteness to discern and systematically to avail himself of the healing virtues of the neglected Jesuits' bark, which he mixed with other substances, so as to conceal its taste and odor. Soon afterward, both Morton and Sydenham, the most celebrated English physicians of their time, adopted the new remedy; and its use, from this period, gradually extended, both in England and France. As it came into general use, it became a most important article of export from Peru; but for a long time the value of the bark to be procured in New Granada (now Colombia) remained unknown, and in order to maintain a commercial

monopoly, extraordinary methods were employed to prevent it from becoming known at a comparatively recent period of Spanish rule in America. The discovery of the alkaloids on which its properties chiefly depend was made early in the nineteenth century.

The chief active principles are the alkaloids, quinine, cinchonine (qq.v.), quinidine, cinchonidine, and quinamine. The relative proportion of the different alkaloids varies widely with the kind of bark and its age when taken from the tree. Some species produce a large amount of quinine and little of other alkaloids, and vice versa. Cinchona bark itself has in later times fallen into comparative disuse, owing to the discovery of the alkaloid quinine, which is now extensively in use in medicine in the form of sulphate or disulphate of quinine, and is given in doses of from 1 to 20 grains in almost all the cases to which the bark was supposed to be applicable. For notes on the production, cultivation, etc., of cinchona, consult: Mueller, *Extra-Tropical Plants* (Melbourne, 1895); Markham, *Peruvian Bark* (London, 1880); King, *Manual of Cinchona Cultivation in India* (Calcutta, 1876); Lambert, *Description of the Genus Cinchona* (London, 1897); Kuntze, *Chinchona; Monographische Studie* (Leipzig, 1878).

CINCHONIDINE, sĭn-kŏn'ĭ-dĭn. See CINCHONINE.

CINCHONINE, sĭn'kō-nĭn (from Neo-Lat. *cinchona*), $C_{19}H_{22}N_2O$. An alkaloid occurring in cinchona bark along with quinine, and having much the same, though by far less powerful, physiological effects as quinine. It is a white crystalline substance, having neither odor nor taste, but leaving a bitter aftertaste in the mouth. It is insoluble in water, and but sparingly soluble in alcohol, ether, or chloroform. It melts at 264.3° C. (507.7° F.). The sulphate of cinchonine, $(C_{19}H_{22}N_2O)_2H_2SO_4 + 2H_2O$, is a crystalline substance with a strong bitter taste, and is moderately soluble in water, alcohol, and chloroform.

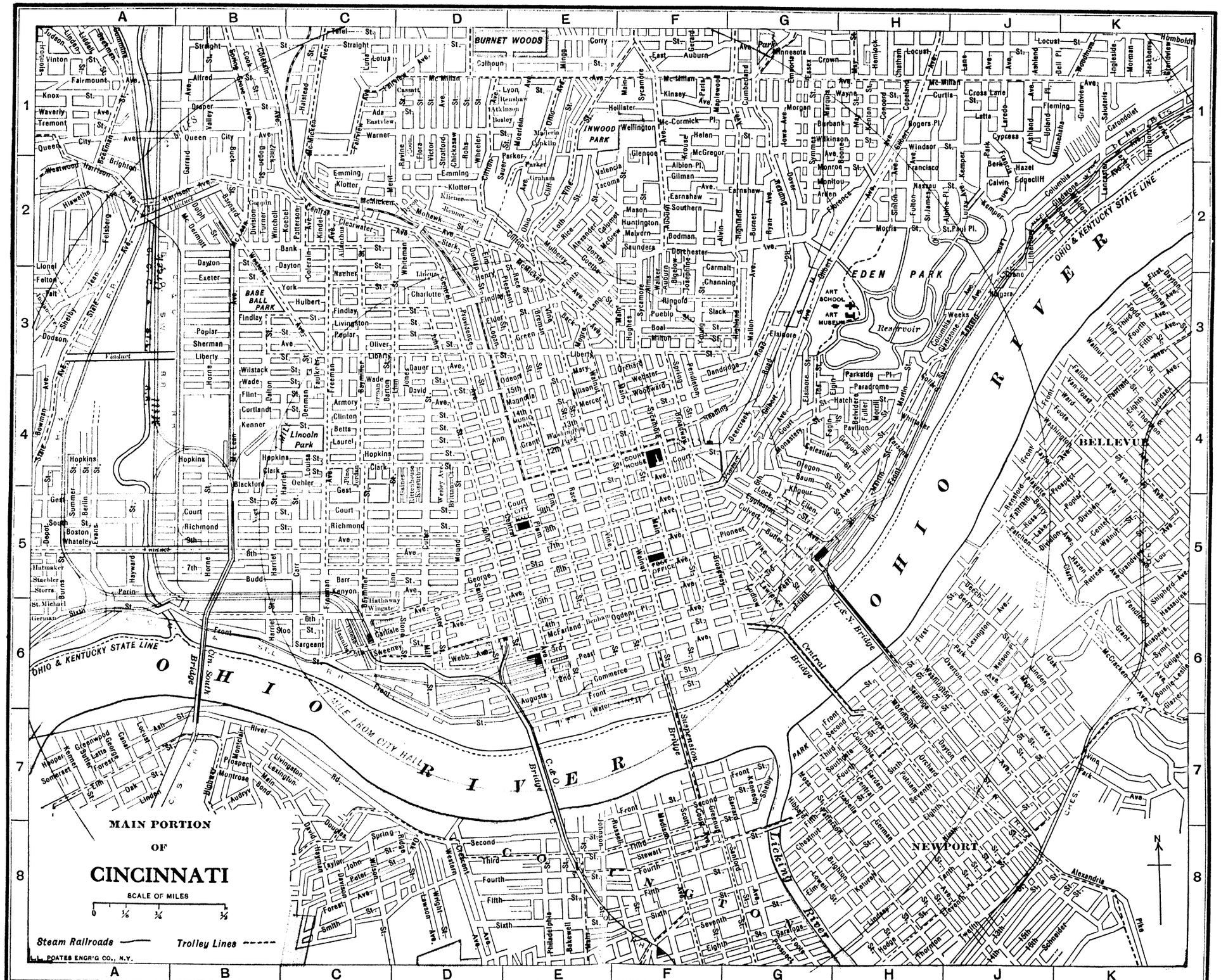
The alkaloid cinchonidine, occurring together with cinchonine, has the same chemical composition as the latter, though a much more pronounced physiological effect. It differs from cinchonine in certain of its physical properties, and its sulphate, $(C_{19}H_{22}N_2O)_2H_2SO_4 + 3H_2O$, is much less soluble in alcohol and practically insoluble in chloroform. See ALKALOIDS.

CINCINNATI, sĭn'sĭn-nă'tĭ. The county seat of Hamilton Co., Ohio; in 1910 the second city in the State, and thirteenth in the United States in population, on the right bank of the Ohio River, in lat. 39° 6′ 30″ N. and long. 84° 30′ W. (Map: Ohio, A 7). It lies 116 miles southwest of Columbus, 270 miles southeast of Chicago, 752 miles from New York, and 830 miles by rail from New Orleans, and is the nearest large city to the centre of population.

The city is built upon two plateaus, surrounded by a semicircle of hills which approach the river above and below the inclosed plain, the ends of the semicircle being only 2½ miles apart. The Ohio River, which here forms a grand curve from east to west, is at low-water mark 431.29 feet above sea level. The first plateau varies from about 65 to 120 feet above low water; a more abrupt rise to the hills at the east, north, and west produces an elevation at the second plateau of about 420 feet above low water, which at the highest point reaches 957 feet above sea level. The summits of the hills—Mount Adams, Mount Auburn, Fairview Heights, Price Hill, and College Hill—accessible by roads and by inclined-plane railways, command superb views of the river, of the Kentucky shore, and the rolling country surrounding the city. Pierced by ravines, these thickly wooded highlands give a picturesque aspect to the city and are covered with the beautiful residences of wealthy citizens, the Clifton, Avondale, Rose Hill, Vernonville, and East Walnut Hills districts being especially noteworthy for their scenic beauty and magnificent homes. The climate is equable. The average temperature in summer is 75.63°; in fall, 56.87°; in winter, 34.37°; in spring, 54.07°; the yearly mean being 55.23°.

Cincinnati covers an area of 70 square miles and has a river frontage extending nearly 22 miles. Brick and the freestone found near at hand, and the blue limestone quarried within the city limits, are largely used for building material. The streets and avenues, averaging 66 feet in width, cross each other at right angles in the old portion of the city and conform to the surface conditions in the new. A public landing or levee extends along Front Street, the sloping shore being paved and lined with floating docks and wharf boats. As three terraces constituting the ascent rise one above another from the river level, the streets become more irregular, and the buildings with extensive grounds spread out. The lowest, or "bottom," streets, sometimes inundated by unusual floods of the Ohio River, are mainly devoted to the manufacturing and the wholesale trades; they also contain the few remaining slum quarters. The central and business portion of the city, with numerous fine stores, is compactly built, and almost the whole plain is filled up; numerous former villages have been absorbed by the extending city. There are more than 50 street-railway lines, all of which converge at or near Fountain Square (mentioned below) as a common starting and terminal point. The city has 608 miles of paved and 350 miles of unpaved streets, 321 miles being of macadam, 41 miles of cobblestones, 182 miles of granite, brick, and wood blocks, and 42 miles of asphalt. There are 497 miles of sewers, and the street railways aggregate 226 miles.

Beautiful suburban villages cluster about Cincinnati and are rendered easily accessible by the street and interurban railroads. Covington, Newport, Dayton, Ludlow, Bellevue, Norwood, Latonia (with its well-known race course), Glendale, Wyoming, Milford, Terrace Park, and Fort Mitchell are some of these near-by towns. Norwood and St Bernard (qq.v.) are entirely surrounded by the larger city. Fort Thomas, a picturesque hill station above Newport, Ky., and one of the most important posts of the United States army, is 40 minutes distant by electric car. The large wire suspension bridge across the Ohio, completed in 1867 at a cost of $1,800,000 and reconstructed in 1895–98 at a cost of $500,000, connects with Covington, Ky. It is 2763 feet long, has a span of 1057 feet, and is 106 feet above low-water mark. Two bridges of wrought iron, resting upon stone piers, connect Cincinnati with Newport, Ky. A fourth bridge, uniting the city with Ludlow, Ky., is that of the Cincinnati Southern Railroad. It cost $3,348,675 and has one of the longest truss spans in the world. A new bridge for this railway is projected. A fifth bridge, the Chesapeake and Ohio, connecting Cincinnati with West Covington, is a cantilever.


MAIN PORTION
OF
CINCINNATI
SCALE OF MILES
0 ⅛ ¼ ⅜
Steam Railroads
Trolley Lines
L.L. POATES ENGR'G CO., N.Y.
OHIO RIVER
KENTUCKY
OHIO & KENTUCKY STATE LINE
BURNET WOODS
INWOOD PARK
EDEN PARK
Reservoir
ART SCHOOL
ART MUSEUM
BASE BALL PARK
Lincoln Park
BELLEVUE
NEWPORT
COVINGTON
Central Bridge
C. & O. Bridge
Suspension Bridge
L. & N. Bridge
Cin. Southern R.R.
C.S.P.R.R.
C.H.&D.R.R.
C.N.O.&T.P.R.R.
C.&O.R.R.
1 MILE FROM CITY HALL
Ohio & Kentucky State Line
Licking River
Mill Creek
Deer Creek
Dayton
Exeter
Liberty
Poplar
Sherman
Hopkins
Court
Richmond
Clark
Gest
Betts
Laurel
Clinton
Armory
Findlay
Hulbert
York
Bank
Straight
Fairmount
Knox
Waverly
Tremont
Queen City
Brighton
Westwood
Harrison
Lionel
Felton
Dodson
Shelby
Bowman
Hilltop
Felsberg
Hatmaker
Stachler
Storrs
St. Michael
German
Boston
Whateley
Evans
Berlin
Summer
Geist
Budd
Barr
Kenyon
Hayward
Parin
Burns
Sixth
Seventh
Eighth
Ninth
Tenth
Eleventh
Twelfth
Front
Second
Third
Fourth
Fifth
Sixth
Seventh
Eighth
Ninth
Tenth
Eleventh
Twelfth
Main
Walnut
Vine
Race
Elm
Plum
Central
Broadway
Sycamore
Lytle
Mound
Linn
Freeman
Baymiller
Harriet
Carr
Stool
Sargeant
Eggleston
Culvert
Pike
Scott
Madison
Garrard
Greenup
Kentucky
Shelby
Lexington
Park
Oregon
Baum
Kilgour
Ellen
Celestial
Monastery
Eagle
Gregory
Hill
Pavilion
Parkside
Paradrome
Dandridge
Elsinore
Boal
Milton
Pueblo
Ringgold
Josephine
Bigelow
Walker
Sycamore
Hughes
Mallon
Highland
Burnet
Ryan
Dorchester
Carmalt
Channing
Slack
Morris
Nassau
Windsor
Francisco
Kemper
Lucas
Alpine Pl.
St. James Pl.
St. Paul Pl.
Fulton
Sinton
Dana
Lenore
Niagara
Weeks
Columbia
Gladstone
Lancaster
Edgecliff
Calvin
Berk
Hazel
Park
Cypress
Ashland
Upland
Fleming
Grandview
Carondolet
Saluteris
Ingleside
Norman
Hackberry
Woodview
Humboldt
Locust
Dell Pl.
Lane
Ave.
Latta
Laredo
Cross Lane
Curtis
Copeland
Chatham
Hemlock
Minnesota
Crown
Easter
Conford
Marquis
Wayne
Kinsey
McMillan
Parkway
Maplewood
Cumberland
Morgan
Barbant
Wilkinson
Symmes
Boone
Monroe
Monfort
Arden
Florence
Dover
Fleming
Lowe
Gilbert
Linwood
Kemper
Lucas
Alpine Pl.
Lenore
Niagara
Weeks
Columbia
Gladstone
Lancaster
Edgecliff
Calvin
Berk
Hazel
Park
Cypress
Ashland
Upland
Fleming
Grandview
Carondolet
Saluteris
Ingleside
Norman
Hackberry
Woodview
Humboldt
Locust
Dell Pl.
Lane
Ave.
Latta
Laredo
Cross Lane
Curtis
Copeland
Chatham
Hemlock
Minnesota
Crown
Easter
Conford
Marquis
Wayne
Kinsey
McMillan
Parkway
Maplewood
Cumberland
Morgan
Barbant
Wilkinson
Symmes
Boone
Monroe
Monfort
Arden
Florence
Dover
Fleming
Lowe
Gilbert
Linwood

Buildings. Among the fine and substantial edifices is the United States Government Building, which contains the post office, customhouse, court rooms, and various offices, erected at a cost of $5,000,000. It is of sawed freestone, three stories high, in the Roman-Corinthian style. The City Hall is equally fine. The county courthouse, with the jail, occupies a whole square; it is built in the Romanesque style. A two million and a half bond issue for a new courthouse to occupy two squares has been authorized by a vote of the people.

The old City Hospital, consisting of eight distinct buildings arranged around a central court, occupies a square of nearly four acres and accommodates 700 patients. The new City Hospital, completed in 1914 at a cost of $4,000,000, and considered to be the largest and most complete municipal hospital in the country, is built upon the ward unit plan and comprises 24 buildings with accommodation for 850 patients. It is located on the suburban hills, occupying a tract of 27 acres. There are also new tuberculosis and contagious hospitals located in open territory. The Chamber of Commerce is located in the new 34-story skyscraper, the tallest in the world outside of New York. The City Workhouse has cells for 700 prisoners, with workshops and grounds for their employment. The new House of Refuge, with separate farms for boys and girls, on the community-cottage plan, located 12 miles from the city, accommodates 225. Longview Asylum for the Insane, at Carthage, 10 miles from the city, is of brick, in the Italian Renaissance style. St. Peter's Roman Catholic Cathedral is an immense structure, in the Grecian style, with a stone spire 224 feet high. The altarpiece is Murillo's original "St. Peter Delivered." St. Paul's Methodist Episcopal Church, the First and Second Presbyterian churches, St. Paul's Protestant Episcopal Pro-Cathedral, the Jewish Synagogue, and St. Frances de Sales Catholic Church on Walnut Hills are all worthy of note. A beautiful structure of classic design is the new Memorial Hall. The numerous newly erected skyscrapers give the city a very striking skyline, while several fine bank buildings are of the highest order of architecture. Cincinnati is the seat of a Roman Catholic archbishop and of a Protestant Episcopal bishop and contains over 300 churches.

Parks. The fine parks, well wooded and picturesque, cover an area of more than 2000 acres. In 1907 a comprehensive plan for a general park, playground, and boulevard system was prepared by George E. Kessler, and since that date over 1500 acres have been added to the parks by purchase and gift, so that the system represents to-day an original investment of $5,000,000 in addition to large donations. The famous Eden Park, or "Garden of Eden," on Mount Adams, has 209 acres inclosed and contains the Art Museum and Art School. The Elsinore Gateway is a striking mediæval reproduction; and from the lofty water tower, a prominent object, the finest view of the surrounding country is obtained. The chief reservoir of the city's water works in the park is a fine, ornamental sheet of water. Burnet Woods, another delightful park, embraces 165 acres. Among the larger of the recent additions are Ault Park (172 acres), Blackly Farm (114 acres), Bloody Run Parkway (84 acres), Mount Airy Forest (800 acres), Mount Echo (51 acres), Mount Storm (67 acres), and Parker's Woods (32 acres), many of them heavily wooded and very hilly. The entire park system is to be connected by parkways and boulevards. The Zoölogical Garden, containing 60 acres of hills, valleys, and ravines, is well stocked with wild animals of all kinds. There are 26 cemeteries; Spring Grove, the best known, has 600 acres of land, lies 6 miles from Fountain Square, and is approached by an avenue 100 feet wide. Among its costly monuments are many private mausoleums, and a bronze statue commemorating the soldiers who died in the Civil War. The most noted piece of ornamentation in the city is the Tyler-Davidson Fountain, on the esplanade of Fountain Square, Fifth Street. It was cast at the Royal Foundry in Munich and cost $200,000. The Garfield statue, at Eighth and Race streets, and the equestrian statue of Gen. W. H. Harrison, first Governor of Ohio, at Eighth and Vine streets, are works of great merit.

Institutions. The educational advantages of the city are unsurpassed. There are four high schools—Hughes, Woodward, Walnut Hills, and Madisonville—and over 60 grammar and intermediate schools. The higher institutions include the municipally owned University of Cincinnati, an outgrowth of McMicken University, with collegiate buildings in Burnet Woods Park and an astronomical department with an observatory at Mount Lookout; Hebrew Union College; St. Joseph's College, and St Xavier's (Jesuit); the Lane Theological Seminary, at Walnut Hills; the Franklin and University schools; several medical, musical, and commercial colleges; and colleges of law, pharmacy, and dentistry.

The Ohio Mechanic's Institute, housed in a fine new building containing also the Emery Auditorium, is a strong factor in the education of the masses. It has many pupils who attend the day and night classes, where they are instructed in literature, science, manual training, and mathematics. The Art Museum and Art School in Eden Park, founded by the women of Cincinnati, has three large buildings modeled after the South Kensington Museum of England. The museum contains a fine collection of paintings, statues, and works of art; and the school is attended by hundreds of students. There are many libraries, including the Young Men's Mercantile, the Law, the Historical, the Mechanic's, and the Public Library. The last is situated in a commodious building on Vine Street, is well equipped, containing over 300,000 works, with numerous reading and circulating branches in outlying districts. The Cuvier Club and the Museum of the Natural History Society, on lower Broadway, have fine collections which are open to the public. The latter is rich in relics of aboriginal mound dwellers, discovered in the vicinity and especially at Madisonville.

Besides the public charities already mentioned, there are numerous benevolent institutions, embracing almost every conceivable need and supported by private munificence.

Hotels, Theatres, and Pleasure Resorts. The chief hotels are the Sinton, Gibson (entirely rebuilt in 1914), Havlin, Metropole, Lackman, Savoy, Alms, Grand, Burnet House, Emery (with a fine commercial arcade), Palace, Honing, and Dennison. There are several good clubs; the Country Club House, with its well-laid-out grounds, is an elaborate suburban establishment of world-wide fame. Among the social clubs are the Queen City, University, Business Men's, and Phœnix. The Literary Club, dating from 1849, is the oldest club of the character in the coun-

try. Among the buildings devoted to amusement the splendid Music Hall, founded and mainly endowed by Reuben Springer, is justly celebrated. It is used also as an exposition building. It is 300 by 500 feet, will seat 5400 persons, and has one of the largest organs in the United States. The Grand Opera House, Lyric Theatre, Emery Auditorium, Walnut Street Theatre, Keith's Theatre, Greenwood Hall, Houck's Opera House, and Olympic Theatre are also noteworthy structures. Owing to the large number of German residents, the city has become noted for its musical societies, while it is also taking rank as a literary and art centre. The biennial musical festivals are distinctive features of its art life. A permanent symphony orchestra ranks with the best in the country. "Over the Rhine," the designation of that part of the city which lies between the canal and the hills, is inhabited almost exclusively by Germans and is famous for its concert and beer gardens. The elaborately installed summer pleasure resorts include Coney Island, 10 miles up the river, reached by hourly excursion steamers; the Lagoon, on the Kentucky side; and Chester Park, near Spring Grove Cemetery.

Industries and Transportation. The commanding position of Cincinnati permits of admirable commercial relations with the Mississippi and Ohio valleys. The Miami and Erie Canal connects with Lake Erie. The commerce by water has diminished since the advent of railroads, but the damming and deepening of the Ohio River channel is expected to result in a great increase of river traffic. Cincinnati is an important railroad centre. The Central Union Depot is a converging station for the Cleveland, Cincinnati, Chicago, and St. Louis, the Baltimore and Ohio, the Chesapeake and Ohio, the Queen and Crescent, the Louisville and Nashville, and other lines. The Cincinnati, Hamilton, and Dayton, the Pennsylvania, and some minor local railways have separate stations. The Cincinnati Southern, with a length of 338 miles, was built and is owned by the city. It is operated, under lease, by the Queen and Crescent system.

According to the thirteenth census (1910) there were 2184 industrial establishments in the city, employing 72,488 persons and representing a total capital of $150,254,000. The value of the combined output was $194,516,000. Among the leading manufactures are those of men's factory clothing, distilled liquors, malt liquors, foundry and machine-shop products, carriages and wagons, boots and shoes, furniture, tobacco and cigars, soaps and candles. Printing, publishing, and playing cards are also important industries. Slaughtering and pork packing are carried on extensively, the value of the output in 1909 being $19,320,000. The last named was formerly the chief industry, giving the nickname "Porkopolis" to the city. Other products comprise all kinds of tanned and curried leather goods, wirework, scales and balances, brick and tile, bridges, cutlery, hosiery and cotton goods, cheese and butter, compressed yeast, biscuits, brooms, brushes, articles representing the wood-turning and wood-carving industries, etc. The Rookwood Pottery, on the crest of Mount Adams, a prominent structure in an Elizabethan style of architecture, produces purely American wares of high artistic merit, which are widely known even beyond the limits of this country.

Government. The city government is organized in accordance with the Ohio Municipal Code of 1902. The council consists of one member from each of the 26 wards of the city, and of six members elected at large. The mayor, auditor, treasurer, solicitor, and council are all elected for two years. The director of public service controls the streets, sewers, water works, markets, public bathhouse, city electrician's and city engineer's departments, and all municipal buildings. The director of public safety is the head of the police and fire departments and a department of charities and corrections. The mayor and his cabinet, composed of the two directors mentioned, form the board of control. The elections are in charge of a bipartisan board of deputy State supervisors and inspectors, appointed by the Secretary of State. The water works completed in 1908 cost over $10,000,000 and are self-supporting.

The city budget for the first half of the year 1914 shows a grand total of $3,162,347.14 to cover the expenses of government. The principal items are: public safety (fire, police, etc.), $930,000; hospitals, health, etc., $242,000; public service (streets, sewers, lighting, etc.), $787,000; water works, $717,000; university and observatory, $150,000 (approximated). Of the above, $1,767,679.32 is provided for by taxation. The bonded debt, Jan. 1, 1914, aggregated $64,775,250.01. Neither the water bonds nor the bonds issued for Southern Railway purposes are a charge upon the taxpayers, and this fact, together with the large and carefully maintained sinking fund of approximately $10,000,000, makes the net amount of bonds taken care of by taxation $25,519,518.36. The Southern Railway income to the city by reason of the rents, sinking fund, and interest paid by the lessee company during the year 1913, was $1,217,750. The sinking-fund levy for redemption and interest purposes for the year 1914 is $1,250,817.

Population. The population in 1810 was 2540; 1850, 115,435; 1870, 216,239; 1880, 255,139; 1890, 296,908; 1900, 325,902; 1910, 363,591; 1914, 402,175. The Cincinnati metropolitan census district approximates 600,000. In 1910 of the total population 15.6 per cent was foreign born, about half being German. The native born of native parentage was 58.7 per cent. There were 19,639 negroes.

History. On his way to attack the Indians at Chillicothe, in 1780, George Rogers Clark stopped at the present site of Cincinnati and erected two small blockhouses, which, however, were soon abandoned. The permanent settlement dates from 1788, when a company from New Jersey and Kentucky settled on part of the land bought from the government in the same year by John Cleves Symmes (q.v.). The village, which early in the following year was laid out by Col. Israel Ludlow, was pedantically called "Losantiville"—a hybrid word, signifying 'the city opposite the mouth of the Licking.' In June, 1789, Fort Washington was built here, and in 1790 the little village was made the capital of the newly erected Hamilton County and was renamed "Cincinnati" by General St. Clair, in honor of the Society of the Cincinnati. For some years it was only a straggling village, inhabited for the most part by typical frontiersmen, and in 1800 it had a population of but 750. In 1802 it was incorporated as a town; and in 1819, with a population of about 7500, it became a city. The opening of steamboat navigation on the Ohio in 1816, the completion of the Miami Canal in 1830, and of the first section of the

Little Miami Railroad in 1843, with the gradual establishment of manufactures, coupled with the advantageous situation for purposes of trade—all tended to make the growth of the city very rapid and gave it the name "The Queen City of the West." Between 1845 and 1860 German immigrants came in considerable numbers. Cincinnati's close commercial and social relations with the South led its citizens for the most part to oppose all antislavery agitation, and the Philanthropist press, established by James G. Birney, was destroyed by mobs in 1836, on the ground that the city's trade with the South could not be maintained if abolitionist papers were tolerated. Cincinnati was, however, the rendezvous for fugitive slaves escaping to Canada, and during the Civil War its sympathies were predominantly with the North. In 1862, during the so-called "siege of Cincinnati," the city was threatened by a Confederate force under Gen. Kirby Smith and for a time was put under martial law. Cincinnati has suffered severely from floods, the most destructive of which occurred in 1832, when the lower part of the city was submerged; in 1883, when more than 150 business houses were inundated; and in 1884 and again in 1913, suffering slightly in a far-reaching disaster. In 1884 (March 28–31) occurred the famous "Cincinnati Riot." A mob, infuriated by the lax administration of the law, broke into the jail and attempted to lynch some murderers who had received light sentences from the courts; but, being frustrated, they burned the courthouse and other buildings. The militia was called out; but before order could be restored, 45 persons had been killed and 148 wounded. The completion (1911) of the Fernbank dam, at a cost of $1,300,000, the largest movable dam in the world at the time of its building, is an important event in the recent history of the city and is expected to increase its commerce very materially.

Bibliography. Clarke, *Prehistoric Remains of Cincinnati* (Cincinnati, 1876); Miller, *Cincinnati's Beginnings* (ib., 1880); Ford, *History of Cincinnati* (Cleveland, 1881); Trollope, *Domestic Manners of the Americans* (London, 1831; new ed., New York, 1901); Greve, *Centennial History of Cincinnati* (Cincinnati, 1904); Goss, *Cincinnati, the Queen City* (ib., 1912).

CINCINNATI, Society of the. An hereditary patriotic society, organized on May 13, 1783, by the American and foreign officers of the Continental army, assembled in their cantonment on the Hudson River, near Fishkill, N. Y. The original meeting was held in the Verplanck House, then the headquarters of Baron Steuben, where the objects of the society were thus formulated: "To perpetuate as well the remembrance of this vast event [the War of the Revolution] as the mutual friendships which have been formed under the pressure of common danger, and in many instances cemented by the blood of the parties, the officers of the American army do hereby, in the most solemn manner, associate, constitute, and combine themselves into one society of friends, to endure as long as they shall endure, or any of their closest male posterity, and in failure thereof, the collateral branches who may be deemed worthy of becoming its supporters and members." And as the officers of the Revolution were now returning to their farms, which they had left to fight the battles of the Republic, they named their society the Society of the Cincinnati, after their Roman prototype, Lucius Quinctius Cincinnatus. The emblem chosen was an eagle, on which appears as the principal figure Cincinnatus receiving a sword and other military insignia presented by three senators, while in the background his wife is standing at the door of their cottage, near which are a plow and other instruments of husbandry. Surrounding this is the motto, *Omnia Relinquit Servare Rempublicam;* on the reverse is shown a sun rising, a city with open gates, and vessels entering the port, and Fame is represented as crowning Cincinnatus with a wreath bearing the inscription, *Virtutis Præmium;* while below are hands joined supporting a heart with the motto, *Esto Perpetua*—the whole suspended from a light blue ribbon edged with white, suggesting the union of France and America.

Membership was accorded to all Continental officers who had served with honor and resigned after three years' service, or who had been honorably discharged for disability, and in turn to the eldest male posterity of such officers. In failure of direct male descent, the honor passed to male descendants through intervening female descendants, and in failure of all direct descent, the collateral descendants who should be judged worthy of becoming members. The society was organized into 13 State societies. The first general meeting was held in Philadelphia, on May 7, 1784, at which delegates from the original States were present, and an amended constitution was adopted, under which a society was authorized and organized in France. Although General Washington was the first president of the society and held office until his death, the society was immediately and continuously unpopular throughout the country. Many persons claimed that it was the beginning of an hereditary aristocracy, and others discerned the formation of an armed league to seize all the military and civil offices in the new Republic. Even so conservative a statesman as Benjamin Franklin questioned the society's influence; while John Adams, Samuel Adams, and Thomas Jefferson were avowedly hostile towards it. The Massachusetts Legislature declared the society to be "dangerous to the peace, liberty, and safety of the Union"; and Ædamus Burke, an Irishman who was a judge of the Supreme Court in South Carolina, published a pamphlet under the pseudonym of "Cassius," which attained a wide circulation, and in which he endeavored to show that the society was subversive of nearly every principle of human rights for which the War of the Revolution was fought. The fact that many members of the French nobility who had served with the Americans, including the Marquis de Lafayette, were members of the society, gave some reason for the popular impression against the Cincinnati; and opposition did not cease until after the "critical period" of American history had passed and the Union was firmly established. One of the most interesting results of the feeling against the society was the founding of Tammany Hall (q.v.) in New York, on the alleged basis of "pure democracy." The State societies of Georgia, North Carolina, Virginia, Delaware, Connecticut, Rhode Island, and New Hampshire soon ceased to exist, and although a temporary interest in the society was revived by the visit of Lafayette to the United States in 1824, still it was not until 1893 that Connecticut, as the first of the revived State societies, was admitted into the general society,

and one by one the other State societies were restored, until, at the triennial convention held in 1902, Georgia, the last of the original 13, was provisionally readmitted. The State societies meet annually, and the general society once in every three years. The presidents general have been: George Washington, Alexander Hamilton, C. Cotesworth Pinckney, Thomas Pinckney, Aaron Ogden, Morgan Lewis, William Popham, H. A. S. Dearborn, Hamilton Fish, William Wayne, and Winslow Warren. Many of the State societies, such as Delaware, Maryland, Massachusetts, New York, and North Carolina, have published State books, in which is given a history of the society. The living hereditary members number about 980.

CINCINNATI, UNIVERSITY OF. An educational institution in Cincinnati, Ohio, the only municipal university in America. The university was founded on bequests made by Charles McMicken in 1858, and by tax levies subsequently authorized by the city of Cincinnati. By Mr. McMicken's will somewhat over $1,000,000 was given the city to found a college; but the State of Louisiana, in which was situated real estate amounting to nearly one-half of the entire bequest, refused to recognize the validity of the will, and the income from the remainder of the estate was insufficient for the desired purpose. The matter, therefore, lapsed until 1870, when the Legislature passed a special bill under which the University of Cincinnati was organized. Bonds were issued by the city to provide funds for buildings. Later, a special tax of three-tenths of a mill for maintenance was authorized. Instruction was first given in 1873, and in 1874 the academic department was organized. In 1896 the Medical College of Ohio, founded in 1819, was reorganized as the medical department of the university. The departments of the university include liberal arts, engineering, medicine, the college for teachers, graduate school, the Clinical and Pathological School of the Cincinnati Hospital (affiliated), and the College of Commerce and evening academic classes. The buildings, grounds, and equipment are valued at $1,807,039; the endowment aggregates $1,500,000; and the total annual income is, approximately, $299,000. The library collections number approximately 96,600 bound volumes, and 79,000 pamphlets. In 1913 there was a faculty of 186 (excluding the clinical staff), and a student body of 1866.

CINCINNATI GROUP. See ORDOVICIAN SYSTEM.

CINCINNATI MUSICAL FESTIVAL. Established by Theodore Thomas in 1873, the festivals were afterward held biennially, under his direction. Hitherto the festival had lasted five days—from Tuesday till Saturday, inclusive—within which period there were given seven concerts, five in the evenings and two in the afternoon (Thursday and Saturday); but in 1902 the season was reduced to four days and five concerts. The music is supplied by the Chicago Orchestra (q.v.), augmented for the occasion by a local chorus of about 500 voices, and well-known soloists. The festival has been an invariable artistic success, but has frequently entailed considerable financial sacrifice on the part of those responsible for the undertaking. After the death of Mr. Thomas in 1905 the festival was under the direction of Frank van der Stucken (q.v.) until 1912. Beginning in 1914 the orchestral part was furnished by the Cincinnati Symphony Orchestra (q.v.), and its regular conductor, Dr. Ernst Kunwald (q.v.), became the conductor of the festival.

CINCINNATI SYMPHONY ORCHESTRA. One of the great orchestras of the United States. In 1893 the "Cincinnati Orchestra Association," with Mrs. William H. Taft as president, was organized for the purpose of assuring to the music lovers of Cincinnati adequate and regular symphony concerts. Previous to that time an orchestra of 40 musicians under Michael Brand had for some years been giving concerts devoted to serious music. In the spring of 1895 the association engaged this orchestra for nine preliminary concerts directed by Anton Seidl, Frank van der Stucken, and Henry Schradieck, chiefly for the purpose of selecting a regular conductor. As a result, the orchestra was strengthened by the addition of a dozen musicians from New York, Van der Stucken was chosen conductor, and Josef Marien concert master. A guarantee fund of $15,000 was pledged, and in the fall of the same year the first regular season of 10 subscription concerts began. The season extends from November to April. The concerts take place on Saturday nights, preceded by a public rehearsal on Friday afternoon. In 1906 the official name of the association was changed to "Cincinnati Symphony Orchestra Association Company." Friction between the Musical Union and Van der Stucken led, in 1907, to the latter's resignation and the disbanding of the orchestra. Under the auspices of the association a number of symphony concerts were given by visiting orchestras during the season of 1907–08. In the following season no concerts were given, but the association was at work perfecting arrangements for the reëstablishment of the orchestra on a permanent basis. When an annual guarantee fund of $50,000 for five years had been pledged by a number of public-spirited citizens a new orchestra of 80 performers, with Leopold Stokowski as conductor, was organized in 1909. The number of subscription concerts was increased from 10 to 12, and a series of eight concerts at popular prices on Sunday afternoons was added. Under the energetic leadership of Mr. Stokowski the orchestra soon rose to the level of the foremost symphony orchestras in the United States, and greatly extended its activities by frequent concert tours to other cities. When Mr. Stokowski resigned in 1912 Dr. Ernst Kunwald of the Berlin Philharmonic was chosen his successor. The original president of the association, Mrs. William H. Taft, was succeeded in 1900 by Mrs. C. R. Holmes. Since 1913 Mrs. Charles P. Taft has been president.

CIN'CINNA'TUS, LUCIUS QUINCTIUS. A hero of the semilegendary period of Roman history, regarded by the later Romans as the model of antique virtue and simple manners. Cincinnatus appears to have been an uncompromising patrician. About 460 B.C. he was chosen consul, and two years later was made dictator. The story says that when the messengers from Rome came to tell Cincinnatus of his new dignity, they found him plowing on his small farm on the Tiber. He soon rescued the Consul Lucius Minucius, who had been defeated and surrounded by the Æqui. After a dictatorship of 16 days, Cincinnatus returned to his farm. When 80 years old, he was once more made dictator (439 B.C.), and suppressed a threatened plebeian insurrection.

CINCIUS (sĭn'shĭ-ŭs) **AL'IMEN'TUS,** LU-

CIUS. A Roman annalist of some note, prætor in Sicily in 210–208 B.C. He wrote in the Greek tongue a number of works, chief among which is his *Annales*, containing the history of Rome from the earliest times to his own day. During this war he himself was imprisoned by Hannibal, who graciously gave him an account of the Carthaginian march through Gaul and across the Alps. His work was more carefully critical than that of most historical students of his time. Consult: Plüss, *De Cinciis Rerum Romanorum Scriptoribus* (Bonn, 1865); Peter, *Veterum Historicorum Romanorum Reliquiæ* (Leipzig, 1870); Schanz, *Geschichte der Romischen Litteratur* (3d ed., Munich, 1907).

CIN'DERELLA (from *cinder*, with dim. termination *-ella;* cf. Fr. *Cendrillon*, and Ger. *Aschenbrödel*, or *Aschenputtel*, of similar meaning). An old fairy tale of Oriental origin. It existed in Egypt in a legend of Rhodopis and Psammetichus. It appears in German lore in the sixteenth century, and is among the fairy tales of Grimm. Perrault and Madame d'Aulnoy popularized it for seventeenth-century France. It deals with the marriage of a household drudge to a prince who discovers her by finding her marvelously small glass slipper, which excites his curiosity as to the owner, and which no court lady is able to wear. The "glass" slipper is an error, arising from the confusion of *verre*, 'glass,' with the old *vair*, 'fur.'

CIN'EAS (Lat., from Gk. *Κινέας, Kineas*). A Thessalian, the chief adviser of Pyrrhus, King of Epirus. He was an eloquent orator and a skilled diplomatist; Pyrrhus declared that Cineas had won more cities by his words than he himself had won by his arms. He visited Rome to arrange for peace after the defeat of the Romans in 280 B.C. While in Rome he learned in a single day, it is said, the name of every man of importance in the city. He was not successful in securing peace, and when he returned he told Pyrrhus that Rome was a temple, and its Senate an assembly of kings.

CIN'EMAT'OGRAPH. See MOVING PICTURES.

CIN'ERA'RIA (Neo-Lat. nom. pl., from Lat. *cinerarius*, ashy, from *cinis*, ashes). A genus of plants belonging to the family Compositæ, and related to *Senecio* (q.v.), from which the species are separated by some minor characters. As commonly understood, the species are numerous and widely distributed; but as recently limited, there are only about 25 species, all of which are indigenous to South Africa. The other species are mostly grouped with *Senecio*. The most common garden *Cineraria* by this classification becomes a *Senecio*. The plants are annual or perennial herbs, with simple-toothed or sinuate-lobed leaves, and many are notable on account of the ashy appearance of their lower leaves; hence the name (Latin *cinis, -eris*, ashes). The cinerarias are popular greenhouse plants; and on account of the ease of cultivation, free blooming, and lasting qualities they are much grown. There has been much discussion regarding the species most cultivated, *Cineraria cruenta*, many strains of which are known. By some it is claimed as a development from the wild species, while others maintain it is a hybrid between *Cineraria cruenta* and other species, all of which are natives of the Canary Islands. The single-flowered forms are the most popular.

CIN'ERARY URNS. Urns used by the nations of antiquity to contain the ashes of the dead when gathered from the funeral pile. Among both Greeks and Romans the urn was buried as we bury a coffin. Among the Romans it was frequently placed in a niche in the family mausoleum or in one of the great columbaria (q.v.). See BURIAL; CREMATION.

CINGALESE, sĭŋ'gȧ-lēz', or SINGHALESE. See CEYLON.

CING'ULUM. See GIRDLE.

CIN'NA, GAIUS HELVIUS. See HELVIUS CINNA, GAIUS.

CIN'NA, LUCIUS CORNELIUS. A Roman noble, one of the principal supporters of Marius. Sulla, after driving Marius from Rome, and before setting out on his expedition against Mithridates, allowed Cinna to be elected to the consulship. At once, as consul (87 B.C.), he impeached Sulla, endeavored to advance the political status of the citizens who had been added to Rome after the Social War, and agitated for the recall of Marius. On Marius's return, after a cruel massacre of Roman citizens, in which some of the most eminent statesmen and orators were slain, Marius and Cinna declared themselves consuls. On the death of Marius, which occurred within a few days of his usurpation, Cinna made Valerius Flaccus his colleague for that year and Papirius Carbo his associate for the two succeeding years. In 84 B.C. he prepared to meet Sulla, who was then on his way from the East to take vengeance upon his enemies, but was slain by his disaffected troops at Brundisium. His daughter Cornelia married Julius Cæsar.

CIN'NABAR (Lat. *cinnabaris*, from Gk. *κιννάβαρι, kinnabari*, vermilion, from Pers. *zinjarf*, Hind. *shangarf*). A name originally applied to the red "dragon's blood" that came from India, and subsequently to other substances of a similar color, but now exclusively used to designate the mercuric sulphide that crystallizes in the hexagonal system. The Romans were familiar with it, and both Pliny and Vitruvius described the use of an ore of mercury for amalgamating gold. It is found both crystallized and massive, and is bright red to brown in color. Cinnabar is the most important ore of mercury, and is mined in Almaden, Spain; at Idria, in Carniola, Austria; and at New Almaden and elsewhere in Santa Clara Co., Cal. It is also found in southern Russia, China, Peru, New South Wales, New Zealand, and South Africa. At Sulphur Bank, Cal., and Steamboat Springs, Nev., it is said to be still forming by solfataric action. The native cinnabar is not of sufficient purity to be used directly as a pigment, but the artificial mercuric sulphide constitutes the vermilion of commerce. "Hepatic cinnabar" is a liver-brown granular or compact variety of cinnabar, which is found at Idria, Austria.

CINNAM'IC (from *cinnamon*) **ACID,** C_6H_5. CH:CH.COOH. A chemical compound of carbon, hydrogen, and oxygen. It crystallizes in colorless prisms, which are sparingly soluble in cold water, but dissolve readily in boiling water, alcohol, and ether. It melts at 133° C. and boils, with or without decomposition, according to the manner in which it is heated, at about 300° C. It exists naturally in a free state in liquid storax, in the balsams of Tolu and Peru, and in gum benzoin, and is often deposited in large crystals from old samples of oil of cinnamon (*Cinnamic aldehyde*) and from cinnamon water. It is always formed from oil of cinnamon when the latter is exposed to the action of the air. Cinnamic acid is usually made by heat-

ing 3 parts of benzaldehyde with 10 parts of acetic anhydride and 3 parts of dehydrated sodium acetate, its formation taking place according to the following equation:

$$\underset{\text{Benzaldehyde}}{C_6H_5CHO} + \underset{\text{Sodium acetate}}{CH_3COONa} =$$

$$\underset{\text{Cinnamic acid (Sodium salt)}}{C_6H_5CH:CHCOONa} + \underset{\text{Water}}{H_2O}$$

This method of preparation, known as Perkin's Reaction, is used for the preparation, not only of cinnamic, but of other unsaturated aromatic acids as well, the sodium salt and anhydride of acetic acid being replaced in the process by the sodium salts and anhydrides of other fatty acids. When fused with caustic potash, cinnamic acid breaks up into benzoic and acetic acids. When heated with lime, it splits up into styrolene (a hydrocarbon) and carbonic acid. By the action of nitric acid it may be converted into ortho-nitro-cinnamic acid, which is related to indigo. Being an unsaturated compound, cinnamic acid readily forms additional compounds with bromine, hydrochloric, hydrobromic, and hydriodic acids, etc. (See CARBON COMPOUNDS.) The substance known as allo-cinnamic acid is stereo-isomeric with cinnamic acid and may be readily converted into the latter.

CIN'NAMON. The dried bark of several species of *Cinnamomum*, belonging to the family Lauraceæ. The leading species, *Cinnomomum zeylanicum*, indigenous to Ceylon, where it may be found growing at an altitude of 3000 feet above sea level, has developed seven or eight well-marked varieties, some of which are ranked by botanists as species. From biblical times the forests supplied the market, but its cultivation was commenced by the Dutch. It is now grown in Brazil, the West Indies, Egypt, the district about Tellicherry (Malabar Coast), and Java, which last two places most nearly approach Ceylon in the quality of their cinnamon; but in none of which, owing to differences of soil, climate, methods of cultivation, or of exposure to sunlight, it produces bark of so high a quality as in its home. Cinnamon plantations are in less favor than formerly, coffee culture being in the ascendant. In the wild, the tree attains the height of about 30 feet and a diameter of 12 to 18 inches, but when cultivated it is made to form stools of four or five stems. When the bark begins to turn brown, usually in less than two years, these stems, which may be 8 feet tall and 2 inches in diameter at the base, are harvested and replaced by fresh ones. After being stripped of leaves and twigs, which latter yield "cinnamon chips," they are girdled transversely and slitted longitudinally, and the bark stripped off with a *mama* or knife similar in form to a nurseryman's budding knife. The pieces are then laid flat and the outer bark removed by scraping or planing. As the bark dries it forms rolls called quills, the smaller of which are inserted into the larger, which when fully dry are tied in bundles for shipment. Cassia cinnamon, cultivated in India and southeastern China, is the bark of *Cinnamomum cassia*. Cassia cinnamon, which is exported to America from China and India, is not, as is often supposed, the same as Chinese cinnamon, none of which reaches our ports, because of the steady demand and high prices paid for it in China. The Cassia variety is cultivated; the Chinese is not, but is obtained from old trees growing, not in Chinese forests, but in those of Annam. These trees die, their bark being stripped from trunks and twigs. Saigon cinnamon is derived from an undetermined species of cinnamon which appeared in commerce about 1875 and which has annually increased in importance. Ceylon cinnamon is yellowish brown, has a peculiar, fragrant odor and sweetish, aromatic, pungent taste. In quality it surpasses the bark obtained from the same species grown in other countries, and also that of the other two species imported into America. Cassia cinnamon is reddish brown, and has a less delicate taste and odor than the preceding. The Saigon variety, from which the outer bark is not removed, has a gray or grayish-brown exterior, with whitish blotches, warts, and wrinkles. All three kinds contain a volatile oil (*Oleum cinnamomi*), tannin, sugar, and mannit, and are recognized in the Pharmacopœia of the United States. The oil, which is given in doses of from one to five drops, is credited with aromatic, stomachic, stimulant, and carminative qualities when taken internally, and with rubefacient properties when applied locally. The bark, due to its tannic acid, has some astringent properties, and is commonly used to flavor astringent powders and mixtures which do not contain iron. From very early times cinnamon has been used as a spice in many culinary preparations. For illustration, see Colored Plate of FLAVORING PLANTS.

CINNAMON FERN. See OSMUNDA.

CINNAMON STONE. The yellow variety of grossularite, or calcium aluminum garnet, called *essonite*, or more properly *hessonite*. The best cinnamon stones come from Ceylon; but specimens of a good quality have been found in Oxford Co., Me., and elsewhere in the United States, some of which would cut into gems of over a carat in weight. See GARNET.

CINNA, OU LA CLÉMENCE D'AUGUSTE, sē'nȧ, o͞o lȧ klȧmȧns' dō'gust'. A tragedy by Pierre Corneille, produced in Paris in 1640, and published in the collected edition of his works in 1644. It is supposed to be his masterpiece and deals with the temporary perfidy of a Roman citizen, friend to Augustus, who is drawn into a conspiracy against his Imperial master by his wife and friends. The conspiracy is discovered, and Augustus pardons the offenders.

CINO DA PISTOJA, chē'nō dȧ pēs-tō'yȧ (originally GUITTONCINO SINIBALDI) (1270–1336). An Italian jurist and poet, born at Pistoja. He began the study of law there and then went to Bologna, where his masters were Lamberto di Ramponi and Franciscus Accursius. On his return, he held a civil position in his native city. Being a partisan of the Ghibelline faction, he became involved in the Guelph and Ghibelline disputes; and as the Guelph faction was triumphant, he had to leave Pistoja, and in the course of his travels visited Rome and journeyed in France. When the death of the Emperor Henry VII left the Ghibelline cause in an apparently hopeless state, he withdrew from party strife, studied law, received the degree of doctor at Bologna (1314), and taught jurisprudence at Treviso, Siena, Florence, Perugia, and Naples. He is the author of two books on law, often reprinted, *Lectura in Codicem Justiniani* (1483) and *Lectura in Digestum Vetus* (1527). Among his pupils were the celebrated Bartolus and Joannes Andreæ. Cino is best remembered now for his friendship with Dante, who speaks of him with enthusiasm in *De Vulgari Eloquio*. Like Dante, he had an ideal lady, to whom he

addressed his sonnets—a certain Selvaggia di Vergiolesi; so there is significance in his verses comforting Dante on the loss of Beatrice. Petrarch called him "Nostro Amoroso Messer Cino." By Carducci he is ranked midway between Cavalcanti and Dante. His works were printed in Rome in 1559. Consult: the edition of his poems by Bindi and Fanfani, *Le rime ridotte a miglior lezione* (Pistoja, 1878); Chiappelli, *Vita e opere giuridiche di Cino da Pistoja* (Turin, 1881); Rossetti, *Dante and his Circle* (London, 1874); Corbellini, *Cino da Pistoja, amore ed esilio* (Pavia, 1898).

CINQ-MARS, săn'mär', HENRI COIFFIER RUZÉ D'EFFIAT, MARQUIS DE (1620–42). A French nobleman and conspirator, the favorite of Louis XIII. He was the son of d'Effiat, marshal of France (1581–1632). Cinq-Mars came to court as a protégé of Richelieu in 1635, receiving a commission in the Royal Guards. In 1637 he became master of the robes to the King, and in 1639 was advanced by Richelieu, for political reasons, to the high office of grand equerry of France. Cinq-Mars, however, was not content to be Richelieu's tool, and had ambitions of his own. He distinguished himself before Arras in 1640 and desired a high military command. Richelieu would advance him no further, and in 1641 Cinq-Mars allied himself with the Orléans faction and became one of the chief opponents of the Cardinal. In 1642 he accompanied the King to the siege of Narbonne, and seemed high in the royal favor; but Richelieu had unearthed particulars of a conspiracy, in which Cinq-Mars was the chief, which included a treaty with Spain, and after the incriminating documents had been laid before the King, Cinq-Mars and his accomplices were arrested. Gaston d'Orléans saved his own life by confessing and implicating others. Cinq-Mars was imprisoned, tried, and executed with De Thou, at Lyons, Sept. 12, 1642. A romantic novel by Alfred de Vigny, *Cinq-Mars, ou une conjuration sous Louis XIII*, is founded on the alleged relations between the conspirator and Maria de Gonzaga, afterward Queen of Poland, and there is an opera by Gounod (1877) based on the story. An English translation of this work has appeared (New York, 1861). For historical accounts, consult Basserie, *La conjuration de Cinq-Mars*, preface by Alfred Mézières (Paris, 1896), and Bazin, *Histoire de France sous Louis XIII* (Paris, 1846).

CINQUECENTO, chĕn'kwâ-chĕn'tô. An Italian technical term, which has been borrowed by other languages, meaning "five hundred," and used to designate the art, literature, or any other form of culture flourishing between 1500 and 1600. Roughly speaking, it is the "Developed Renaissance," "High Renaissance," "The Golden Age," from Leonardo da Vinci to Paolo Veronese, though its second half was almost everywhere, except in Venice, a period of decadence.

CINQUEFOIL, sĭnk'foil'. See POTENTILLA.

CINQUE (sĭnk) **PORTS** (Fr., five ports). The ancient collective name of the five English Channel ports—Sandwich, Dover, Hythe, Romney, and Hastings—which were enfranchised by Edward the Confessor. William the Conqueror subsequently granted them the privileges of an almost independent state, under command of a warden, with a court at Dover Castle. Winchelsea and Rye were added later. Up to the reign of Henry VII their chief function was the supply of the country's naval contingent. In the time of Edward I they provided 57 fully equipped ships and frequently extended their powers by equipping piratical expeditions. Dating from the revolution of 1688, their privileges were gradually abolished, the Lord Warden's jurisdiction ceasing in 1835. The appointment of Lord Warden with residence, and the ancient privilege of carrying the canopy over the sovereign's head at a coronation, still exists. The official residence, Walmer Castle, near Deal, dates from the time of Henry VIII. There, as Warden, the Duke of Wellington lived each autumn from 1829, and he there died in 1852. Noteworthy wardens of recent date are Earl Granville, the Right Honorable W. H. Smith, the Marquis of Dufferin, and the Marquis of Salisbury. Consult Burrows, *Cinque Ports* (2d ed., London, 1888).

CINTIO, or CINTHIO, chēn'tê-ō. See GIRALDI, GIOVANNI BATTISTA.

CINTRA, sēn'trâ. A small but picturesquely situated town in Portugal, in the Province of Estremadura, about 15 miles west-northwest of Lisbon (Map: Portugal, A 3). It stands on the declivity of the Sierra de Cintra, and contains a palace of Moorish and Christian architecture, anciently occupied by the Moorish kings, and subsequently a favorite residence of the Christian monarchs. A charming view of the town and of the sea is to be had from the top of a hill crowned with the ruins of a Moorish castle. On another hilltop stands La Pena, once a convent, afterward a residence of the King of Portugal, who restored it and gave it the outward appearance of a feudal castle. In the neighborhood, also, is what is called the Cork Convent, named so on account of its cork-lined cells. Cintra is a favorite summer resort with the residents of Lisbon. It is celebrated for the convention concluded, Aug. 22, 1808, between the British, the Portuguese, and the French, by which the latter were allowed to evacuate Portugal without interference. Pop., 1890, 4846; 1900, 5918.

CIONE, chê-ō'nâ, ANDREA DI. See ORCAGNA.

CIOTAT, syô'tà', LA (Prov. *Cioutat*, from Lat. *civitas*, state, city). A seaport town of France, in the Department of Bouches-du-Rhône, on the west shore of a bay in the Mediterranean, about 15 miles southeast of Marseilles, in the midst of olive, orange, and pomegranate plantations (Map: France, S., K 5). It is well built and has a good and commodious harbor, formed by a mole, and well defended. One of its shipyards alone employs 2000 men. It has a school of maritime instruction, large fisheries, cotton manufactories, and sea baths. There is an active trade in the produce of the district. Pop. (commune), 1901, 11,622; 1911, 9975.

CIPARIU, chê-pä'rĭ, TIMOTEO (1805–87). A Rumanian ecclesiastic and philologist, born in Transylvania. As professor in the theological seminary of Blasendorf he founded in 1867 the *Organul Luminarei* ('Organ of Light'), the first Rumanian journal to be printed in Latin characters. He was the most celebrated representative of the Latinist school in Transylvania, and was the author of the following important works: *De Latinitate Linguæ Valachicæ* (1855); *De Nomine Valachorum Gentili* (1857); *De Re Litteraria Valachorum* (1858); *Grammatica Limbei-Romîne* (2 vols., 1859–69). The latter work was honored by a prize from the Rumanian Academy.

CI'PHER (from OF. *cifre*, Ger. *Ziffer;* from ML. *cifra, zifera*, Ar. *sifr, safr*, cipher, from *safara*, to be emptied). An ornamental arrangement of the initial letters of a name by which

they become also a private mark, adopted by artists and architects as distinctive of their work. A well-known example is the cipher of Albrecht Dürer (q.v.), reproduced in the article on this artist. That of the American painter Whistler also is well known—a conventionalized yellow butterfly. Any complex arrangement of letters which an individual employs as his signature becomes his own property.

CIPHER. See CRYPTOGRAPHY; SIGNALING AND TELEGRAPHING, MILITARY.

CIPRIANI, chē'prē-ä'nē, GIOVANNI BATTISTA (1727–85). An Italian painter, draftsman, and engraver. He was born in Florence and studied there under Gabiani and Ignatius Hugford, an Englishman. In 1750 he went to Rome, where he met his lifelong friend and coworker, Bartolozzi (q.v.), and English artists who invited him to England. There he spent the remainder of his life. He executed pictures and mural decorations for English private residences and public buildings, and played a leading part in the history of the Royal Academy, of which he was one of the original members. He is chiefly important, however, as a draftsman for Bartolozzi's engravings and mezzotints. By his skillful and elegant drawing he did much to form the style of the English mezzotint engravers of the eighteenth century. The British and South Kensington museums and those of Florence, Lille, and Orléans contain most of his drawings. Cipriani died at Hammersmith, and was buried in the Chelsea burial ground, where Bartolozzi erected a monument to his memory. Consult Tuer, *Bartolozzi and his Works* (London, 1882), and Fincham, *Art of British and American Book Plates* (New York, 1897).

CIRCASSIA, sĭr-kăsh'ĭ-ȧ. A region of the northwestern Caucasus (q.v.) (Map: Russia, F 6), extending approximately from the Taman Peninsula and the Kuban River to the Abkaz district along the eastern coast of the Black Sea. It lies within the Ekaterinodar and Kutais governments and comprises the administrative district known as the "Black Sea Circle." Circassia has been nominally a part of Russia since 1829. It was only after a struggle of 35 years, however, that Russian sway was fully established. The region contains numerous oil fields.

CIRCASSIANS, sĕr-kăsh'ȧnz, or **TCHERKES'SES.** A term applied in general to the northwestern group of peoples inhabiting the region of the Caucasus, and in particular to the Adighe or Tcherkesses (the first is their own name; the second, from which the word *Circassian* comes, is that by which they are known to the Turks and Russians), the most noteworthy of these tribes. Other Circassian tribes are the Abkhasians on the Black Sea, the Kabardians, Shapsukhs, Abadzeh, etc., all related more closely by language than by race; for all are more or less mixed with Tatar, Asiatic, Aryan, and other intrusive elements. Except the Abkhasians (the difference may be due to artificial lateral compression), the Circassian tribes tend to be brachycephalic, and of average rather than tall stature. The Abkhasians are darker skinned, and not so well formed or featured as the Circassians proper; and of the latter those of Kuban are the least attractive. The Kabardians, who formerly laid claim to greater purity of blood, are now less pure than some of the Adighe. The Circassians have produced many men and women of great physical beauty, and Circassian girls, famous for their good looks, have long adorned the harems of Turkish sultans, pashas, and men of wealth, refining to no little extent their Mongolian blood—many of them, indeed, being ready enough to change their mountain home for a Turkish or Persian palace. According to Professor von Luschan, however, the number of such intermarriages has been greatly exaggerated in popular literature. The ethics of the Circassians have always been of a primitive type, and *Cherkess* is said to signify as much as "brigand"; but over against this may be set their hospitality and brave struggle for liberty against the Russians. When the Russian conquest was completed in 1864, more than 300,000 of them left the Caucasus for various parts of Asiatic and European Turkey, and they are said later to have had a share in the Bulgarian massacres. Those who are still in the old habitat number about 150,000, and are losing more and more of their racial purity. The higher classes of the Circassians have adopted Islam, while among the lower exists a certain kind of Christianity or Islamism in combination with survivals of ancient heathenism. The languages of the Circassian tribes are thought by some authorities to be incorporating rather than agglutinative. Since Neumann's *Russland und die Tscherkessen* (1840), the literature about the Circassians has grown considerably. Especial reference may be made to R. von Erckert's *Der Kaukasus und seine Völker* (Leipzig, 1887), and the fourth volume of Chantre's comprehensive *Recherches anthropologiques dans le Caucase* (Lyons, 1885–87).

CIRCE, sĕr'sē (Lat., from Gk. *Kίρκη, Kirkē*). In Homer, the sister of Aeëtes, and daughter of Helios and the ocean nymph Perse. She lived in a valley of the island of Ææa, surrounded by human beings whom she had transformed into wolves and lions. Here she transformed into swine the companions of Odysseus, and when the hero came to her palace she sought to exercise the same enchantment upon him. Protected by the magic herb, *moly* (q.v.), which Hermes had given him, he withstood her sorceries, and forced her to disenchant his followers. He then remained with her a year, and learned from her how to converse with Tiresias (q.v.) in the land of shades about his future, and how to avoid the dangers that still beset his homeward way. A Cyclic epic told of Telegonus, the son of Circe and Odysseus, who, landing in Ithaca, unwittingly killed his father in battle. Later writers, possibly even Hesiod, placed the island of Circe in the Tyrrhenian Sea, and still later it was identified with the Circean promontory (see CIRCEI). In the Alexandrian writers Circe also appears in the story of the Argonauts, and to the same period belongs the story that, in jealousy of Scylla, she transformed her into a monster, by pouring her magic drugs into the water where Scylla bathed. See PICUS.

CIRCE'I, or **CIRCEI'I.** A town of ancient Latium, situated on the commanding promontory known as Mons Circeius (Monte Circeo), about 80 miles southeast of Rome. Though of ancient date, Circei was never very famous, though Tiberius and Domitian had villas there. The oysters of Circei were much esteemed by the Romans. On the hill, about 3 miles from the sea, are remains of early walls of polygonal masonry, part of an ancient acropolis. Consult Ashby, "Monte Circeo," in *Mélanges de l'école française de Rome*, XXV, pp. 157 ff. (1905). See CIRCE.

CIRCENSIAN (sĕr-sĕn'shan) **GAMES.** See CIRCUS.

CIR'CINATE (Lat. *circinnus*, pair of compasses, from Gk. *κίρκος*, *kirkos*, circle). A name given to the peculiar vernation (leaf-bud condition) of ferns. When a fern leaf unfolds it resembles a crozier or shepherd's crook, as if it had been rolled from the tip. This characteristic vernation of ferns is also observed among the Cycads, the most fernlike of living gymnosperms.

CIR'CLE (from Lat. *circulus*, dim. of *circus*, Gk. *κίρκος*, *kirkos*, *κρίκος*, *krikos*, circle). The locus (q.v.) of all points in a plane at an equal finite distance from a fixed point in that plane. The fixed point is called the centre, and the space inclosed, or, more properly, its measure, the area of the circle. The segment of any straight line intercepted by the circle (*AB* in Fig. 1) is called a chord. Any chord passing through the centre, *O*, is called a diameter, as *A'B'*. The centre bisects any diameter, and the halves are called radii. Any line drawn from an external point cutting the circle in two points, as *PQ*, is called a secant; and any line which has contact with the circle, but does not intersect it when produced, as *B'T*, is called a tangent. Any portion of the area limited by two radii, as *OA* and *OB*, is called a sector; and any portion of the circle, *BA'A*, is called an arc. A chord is said to divide the area into segments; the segments are equal if the chord is a diameter. A plane passing through the centre of a sphere cuts the surface in a circle called a great circle of the sphere. Circles of longitude are great circles. Other circles of a sphere are called small circles. Ancient writers usually called the circle, as above defined, a circumference, the word "circle" being applied to the space inclosed. In modern geometry, at least above the elements, the word "circumference" is not used, and the word "circle" applies to the curve.

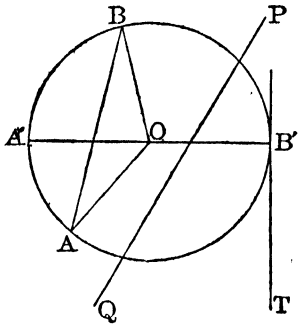


FIG. 1.

In coördinate geometry (see ANALYTIC GEOMETRY), the circle ranks as a curve of the second order (see CURVE) and belongs to the conic sections: the section of a right circular cone, perpendicular to the axis of the cone, being a circle. The Cartesian equation of the circle, taking its centre as the origin, is $x^2 + y^2 = r^2$. The constructions of Euclidean geometry being limited to the use of two instruments, the straightedge and the compasses, the circle and the straight line are the two basal elements of plane geometry. A few of the leading properties of the circle are:

1. The ratio of the circumference to the diameter is a constant; this is designated by the symbol π. This ratio is approximately 3.141592; 3.1416 and even $3\frac{1}{7}$ are sufficiently accurate for ordinary purposes; thus the area of a circle of radius 5 inches is 3.1416×5^2 square inches, or 78.54 square inches. The ratio π has an interesting history. The papyrus of Ahmes (q.v.), dating from before 1700 B.C., contains the value $(\frac{16}{9})^2$ or 3.1605; Archimedes (287–212 B.C.) described it as lying between $3\frac{1}{7}$ and $3\frac{10}{71}$; the Almagest (q.v.) gives it as

$$3 + \frac{8}{60} + \frac{30}{60 \cdot 60} = 3.14166;$$

the Romans often used $3\frac{1}{8}$; Aryabhatta (q.v.) gave 3.1416; Bhaskara (q.v.), 3.14166; and the Chinese of the sixth century A.D., $\sqrt{9}$. Ludolph van Ceulen (q.v.) about 1586 computed π to 35 decimal places, and in recent times it has been carried to over 700 places. In 1794 Legendre proved that π is an irrational number. Furthermore, it is not only incommensurable—that is, not expressible as the quotient of two integers—but it has been proved by Lindemann (1882) to be transcendental. This means that π cannot be a root of an algebraic equation with integral coefficients. Certain irrational (incommensurable) numbers may be represented by elementary geometric lines; e.g. $\sqrt{2}$ is represented by the diagonal of a square of side 1; but π, being transcendental, cannot be represented by any construction depending solely upon the straightedge and compasses. It requires a transcendental curve, such as the integraph of Abdank-Abakanowicz.

Thus, through labors like those of Gauss, Hermite, and Lindemann, the true nature of π has been determined, and efforts at circle squaring by the instruments of elementary geometry have been proved futile. Modern analysis has shown π to be expressible by certain infinite series; e.g.,

$$\pi = 4\left(1 - \frac{1}{3} + \frac{1}{5} - \frac{1}{7} + \frac{1}{9} - \dots\right) \text{ (Leibnitz);}$$

or in the form of a continued fraction, as in

$$\pi = \cfrac{4}{1 + \cfrac{1}{2 + \cfrac{9}{2 + \cfrac{25}{2 + \cfrac{49}{2 + \dots}}}}} \text{ (Brouncker)};$$

or of a continued product, as

$$\frac{\pi}{2} = \frac{2 \cdot 2 \cdot 4 \cdot 4 \cdot 6 \cdot 6 \cdot 8 \cdots}{1 \cdot 3 \cdot 3 \cdot 5 \cdot 5 \cdot 7 \cdot 7 \cdots} \text{ (Wallis).}$$

The method of approximating this ratio commonly used before the introduction of calculus (q.v.) consisted in computing the perimeters of the circumscribed and inscribed polygons of a circle of diameter 1. For, since the length of the circumference in this case is the desired ratio, the value of π lies between the values of the perimeters of the given polygons. A history of the development of this important problem of geometry will be found in Rudio, *Archimedes, Huygens, Lambert, Legendre: vier Abhandlungen uber die Kreismessung* (Leipzig, 1892).

2. The centre of the circle is a centre of symmetry, and any diameter is an axis of symmetry (q.v.).

3. The perimeter of a circle of radius r is $2\pi r$, and its area πr^2. The area is greater than that of any plane figure of the same perimeter.

4. Concentric circles—that is, those having the same centre—never intersect.

5. Circles are similar figures (see SIMILARITY), and their areas are proportional to the squares of their radii or diameters.

6. Arcs of a circle are proportional to the angles subtended at the centre, and conversely. This property forms the basis of angular measure.

Circular Measure. The supposed number of days in the year early led to the division of the circle into 360 equal parts, for use in astronomical instruments. A knowledge of the regular hexagon probably led to the further division of 360 degrees into six parts of 60 degrees each. The Babylonians divided each degree into 60 equal parts, and each subdivision into 60 equal parts, thus producing the sexagesimal scale. (See NOTATION.) Thus the circumference of a circle is divided into 360 equal parts, called degrees; each degree into 60 equal parts, called minutes; and each minute into 60 equal parts, called seconds. Further divisions are better represented by decimal fractions. The circle is also commonly divided into four equal parts of 90 degrees each, called quadrants. By connecting the centre of a circle with the points of equal division on the circumference, equal angles are formed, whose magnitude is independent of the length of the radius; thus producing an angle measure, the basis of the protractor (q.v.). For scientific purposes, however, it would be more convenient to divide a quadrant into 100 equal parts, called grades, and each of these into 100 equal parts, called centesimal minutes, and each of these into 100 equal parts, called centesimal seconds. This plan, attempted in France as part of the metric system, is known as the centesimal division of the circle. For example, 3^g, 45′ 17″ (read 3 grades, 45 centesimal minutes, and 17 centesimal seconds) may be written 3.4517. To translate this into sexagesimal notation, 3^g equals $3 \times \frac{90}{100}° = 2.7°$, 45 centesimal minutes $45 \times \frac{90}{10000}° = 0.405'$ or 0.00675°; and so on. The sexagesimal system is, however, so well established that the centesimal has only very recently, in France, come to take important rank.

Radian Measure. In higher mathematics, especially in the calculus, another unit of angular measure, called the *radian*, is in general use. This is defined as the angle subtended at the centre of a circle by an arc equal in length to the radius (Fig. 2). The relation of the radian to other angular units is as follows:

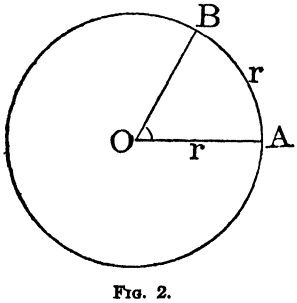


FIG. 2.

$$\frac{\text{The radian } AOB}{4 \text{ right angles}} = \frac{\text{arc } AB}{\text{circumference}} = \frac{r}{2\pi r} = \frac{1}{2\pi}.$$

Therefore, the radian equals $\frac{1}{2\pi} \times 4$ right angles $= \frac{2}{\pi} \times 1$ right angle. In degrees one radian is

$$2 \cdot \frac{90°}{\pi} = 57.29°+,$$

or, more nearly,

$$57° 17' 44.6666''+.$$

$\frac{\pi}{2}$ radians = a quadrant; π radians = 180°, and

$$2\pi \text{ radians} = 360°.$$

Since 1 radian $= \frac{180°}{\pi}$, $1° = \frac{\pi \text{ radians}}{180}$ and

$$n° = \frac{n\pi}{180} \text{ radians}.$$

The word "radian" is commonly omitted in discussions of angles; e.g., π radians = 180° is expressed $\pi = 180°$.

A few of the modern theories concerning the circle are suggested by the following:

1. *Coaxal Circles.*—The radical axis XX_1 (Fig. 3) of two circles of radii r_1, r_2 is the line perpendicular to their centre line C_1C_2, and dividing

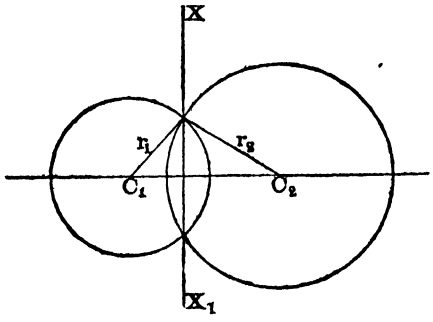


FIG. 3.

this line so that the difference of the squares on the segments equals the difference of the squares on the radii. The common chord of two intersecting circles is a segment of their radical axis. All circles having a common radical axis pass through two real or two imaginary points, and such a group of circles is called a coaxal system. If two circles are concentric, their radical axis is the line at infinity. The radical axis of two circles is also the locus of points from which tangents to the two circles are equal. If a variable polygon inscribed in a circle of a coaxal system moves so that all the sides but one touch fixed circles of the system, the last side also touches, in every position, a fixed circle of the system (Poncelet's theorem).

In analytic geometry, all circles must be regarded as having in common two infinitely distant imaginary points called the circular points at infinity. A system of coaxal circles has then really four common points, counting imaginary as well as real intersections.

2. *Inversion.*—Let O (Fig. 4) be the centre of a circle of radius r, and P, Q two points on

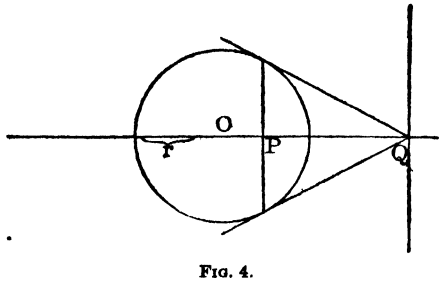


FIG. 4.

a line through O, such that $OP \cdot OQ = r^2$. P and Q are called inverse points with respect to the circle. Either point is said to be the inverse of the other. The circle and its centre are called the circle and centre of inversion, and r the constant of inversion. If every point of a plane figure be inverted with respect to a circle, or every point of a space figure with respect to a sphere, the resulting figure is called the inverse image of the given one. The inverse of a circle is either a straight line or a circle, according as

the centre of inversion is or is not on the given circle. The centre of inversion is then the centre of similitude of the original circle and its inverse; and the circle, its inverse, and the circle of inversion are coaxal. The theory of inversion was invented by Stubbs and Ingram in 1842, and has been made use of by Lord Kelvin in several important propositions of mathematical physics.

3. *Pole and Polar.*—The polar of any point P, with respect to a circle, is the perpendicular to the diameter OP drawn through the inverse point. Hence the polar of a point exterior to a circle is the chord joining the points of contact of the tangents drawn from the external point. Any point P lying on the polar of a point Q has its own polar passing through Q. The polars of any two points, and the line joining the points, form a triangle called the *self-reciprocal* triangle with respect to the circle, the three vertices being the poles of the opposite sides.

4. *Involution.*—Pairs of inverse points, P, P'; Q, Q'; etc., on the same straight line, form a system in involution, when the relation between them is $OP \cdot OP' = OQ \cdot OQ' = \ldots = r^2$. Here the inverse points are usually called *conjugate points*. Any four points whatever of a system in involution on a straight line have their anharmonic ratio (q.v.) equal to that of their four conjugates.

5. *Nine-Points Circle.*—The intersection of the three altitudes of a triangle is called the orthocentre. The mid-points of the segments from the orthocentre to the vertices constitute three points, the feet of the altitudes three more, and the mid-points of the sides of the triangle three more—all nine lying on the circumference of a circle, called the *nine-points circle.*

In Fig. 5, O is the orthocentre and K, L, G, D, M, E, H, N, F are the nine points.

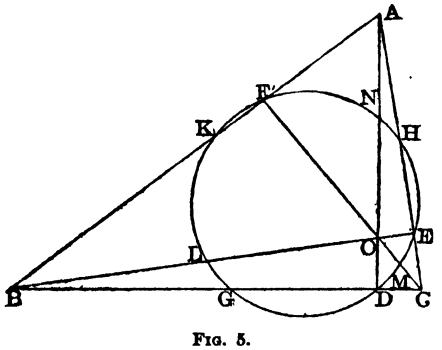


FIG. 5.

6. *Seven-Points Circle* (Brocard circle).—Point S in Fig. 6, so placed that its distances from the sides of the triangle ABC are proportional to the lengths of the respective sides, is called the symmedian point of the triangle. Lines through this point parallel to the sides cut them in six points, D, E', E, F', F, D', which lie on a circle called the triplicate-ratio or Tucker circle. If lines were drawn through A, B, C, parallel to the sides of the triangles DEF, $D'E'F'$, they would intersect one another and $F'E$, DE', FD' in P, P', L, M, N. These five points, together with S and the circumcentre of the triangle, lie on a circle called the seven-points or Brocard circle. P, P' are called the Brocard points.

Consult: McClelland, *Geometry of the Circle* (London, 1891); Casey, *Sequel to Euclid* (Dublin, 1888); Catalan, *Théorèmes et problèmes de géométrie élémentaire* (Paris, 1870); D. E. Smith, "The History and Transcendance of π," in Young, *Monographs on Topics in Modern Mathematics* (New York, 1911); Beman and Smith,

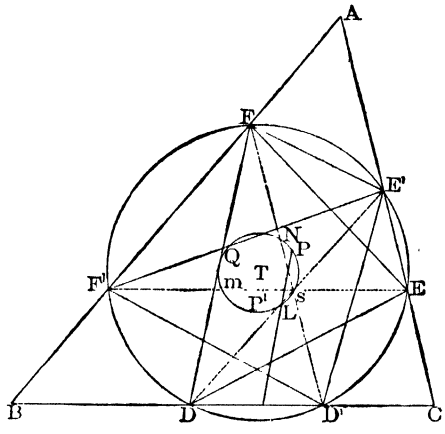


FIG. 6.

Famous Problems of Elementary Geometry (Boston, 1897), translation of Klein, *Vortrage über ausgewahlte Fragen der Elementargeometrie;* Beutel, *Die Quadratur des Kreises* (Leipzig, 1913).

CIRCLE, MAGIC. A space in which sorcerers were wont, according to the ancient popular belief, to protect themselves from the fury of the evil spirits they had raised. This circle was usually formed on a piece of ground from 7 to 9 feet square, in the midst of some dark forest, in a churchyard, vault, or other lonely and dismal spot. The circle was described at midnight in certain conditions of the moon and weather. Inside the outer circle was another somewhat less, in the centre of which the sorcerer had his seat. The spaces between the circles, as well as between the parallel lines that inclosed the larger one, were filled "with all the holy names of God," and a variety of other characters supposed to be potent against the powers of evil. Without the protection of this circle, the magician, it was believed, would have been carried off by the spirits, as he would have been had he by chance got out of the charmed space.

CIRCLE, MERIDIAN. See MERIDIAN CIRCLE.

CIRCLE, MURAL. See MURAL CIRCLE.

CIR'CLEVILLE. A city and the county seat of Pickaway Co., Ohio, 25 miles (direct) south of Columbus; on the Scioto River, the Ohio and Erie Canal, and the Cincinnati and Muskingum Valley and the Norfolk and Western railroads (Map: Ohio, E 6). It was laid out in 1810, on the site of a prehistoric circular fortification (described in Howe's *History of Ohio*), from which the name is taken. Circleville contains a county infirmary, a children's home, and a home and hospital for old ladies. The surrounding country is very fertile, and the city has extensive strawboard works, canneries, and flour and corn-meal mills. Settled in 1806, Circleville was incorporated as a village in 1814, and as a city in 1853. It is now governed, under the Ohio Municipal Code of 1902, by a mayor, elected biennially, and a council. One of the city's historic places is the Logan Elm, where John Logan

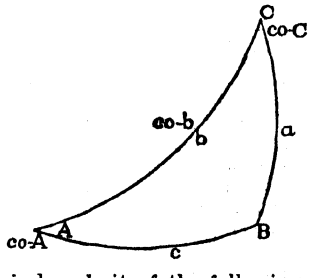
(q.v.), the Indian chief, made his celebrated speech. A park has been laid out at the place. Pop., 1890, 6556; 1900, 6991; 1910, 6744.

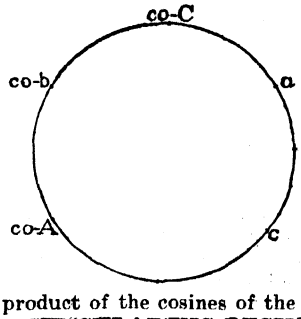
CIR'CUIT (Fr. *circuit*, from Lat. *circuitus*, from *circuire, circumire*, to go around; from *circum*, around + *ire*, to go). A territorial division, within which a court of justice is held at stated times and places. The practice of dividing England into circuits, and assigning to each division judges whose duty it is to hold court therein at prescribed places and terms, became settled during the reign of Edward I. As early as the first Magna Charta, in 1215, it was provided that certain *assizes* (q.v.) for the recovery of lands should always be taken in the counties in which the lands were situated, and that two justices of the King should be sent to each county four times a year for that purpose. But the evils arising from the remote and irregular sittings of the King's court (*curia regis*) were not obviated until the end of that century. This early arrangement of circuits has been modified from time to time, and it is now regulated by the Judicature Act of 1875 and an order in council of 1876. In the United States there are two classes of circuits—one belonging to the judicial system of the Federal government, the other to that of the State. For a description of the several courts designated as circuit courts, see COURT.

CIR'CULAR NOTES. See CREDIT, LETTERS OF.

CIRCULAR NUMBERS. Numbers whose powers end with the same figure as do the numbers themselves: thus, the numbers ending with 0, 1, 5, 6; for any power of any one of these also ends with 0, 1, 5, 6 respectively.

CIRCULAR PARTS. The five elements involved in a rule for solving right-angled spherical triangles, formulated by John Napier (q.v.). The five parts, *c*, *a*, complement of *A*, complement of *C*, and complement of *b*, as indicated in the triangle, when arranged on the circumference of a circle, admit of the following selection: Any part, as *co-C*, has two adjacent parts, as *co-b*, *a*, and two opposite parts, as *co-A*, *c*. The rules of Napier connect these by the following mnemonic: The sine of the middle part equals the product of the tangents of the adjacent parts, and the sine of the middle part equals the product of the cosines of the opposite parts.





CIR'CULAT'ING DECIMALS. Decimals in which one or more figures are continually repeated in the same order, e.g., 0.333...., 0.25666 . . . . , 0.3172172 . . . . , are circulating decimals. These are sometimes called repeating decimals, and the figure or set of figures repeated is called the *repetend*. If the repetend begins at the decimal point, the decimal is called a pure circulate; otherwise the decimal is called a mixed circulate; e.g., 0.2727 . . . . is a pure circulate, but 0.25999 . . . . is mixed. If the repetend contains but one figure, it is called simple—otherwise, compound. If the first figures of repetends are of the same order, the repetends are said to be similar; and if they end with figures of the same order, they are said to be conterminous; e.g., 0.639292 . . . . and 0.253232 . . . . are both similar and conterminous. Periods over the first and last figures of the repetend serve to indicate that a decimal is a circulate; thus, $0.27\dot{3}=0.27373\ldots$. Operations with circulating decimals may be performed in the usual way, or the circulates may be reduced to common fractions. This is usually done by applying the formula for the sum of an infinite geometric progression. (See SERIES.) Thus, $0.\dot{3}\dot{5}$ is the same as $0.35 + 0.0035 + 0.000035 + \ldots$, in which the first term is 0.35 and the rate 0.01; hence, the sum is

$$\frac{0.35}{1-0.01}=\frac{0.35}{0.99}=\frac{35}{99}.$$

That this fraction is the same as the decimal 0.35 may be seen by division.

CIRCULATING LIBRARY. See LIBRARIES.

CIRCULATING MEDIUM. See MONEY.

CIR'CULA'TION (Lat. *circulatio*, circular course, from *circulus*, circle, dim. of *circus*, circle). A term used in anatomy and physiology to designate the course of the blood through the blood vessels. A knowledge of the heart, arteries, capillaries, and veins is essential to a complete understanding of the subject of circulation; but by means of a diagram (Fig. 1) we can indicate the circulation of the blood in a general way. The shaded part of Fig. 1 represents the vessels carrying the venous blood, which has given up its oxygen to the body and taken in exchange carbonic-acid gas. The unshaded diagram represents the vessels filled with oxygenated or arterial blood. The heart is shown here as composed of four chambers, of which the two right belong to the circulation of venous blood and the two left to that of arterial blood. The blood from the whole body is brought to the right auricle of the heart (*c*) by two large veins, the superior vena cava and the inferior vena cava, both represented by *d*. By the contraction of this chamber the blood is forced through the right auriculo-ventricular opening into the second chamber of the right side of the heart, the right ventricle (*v*), and this by its contrac-

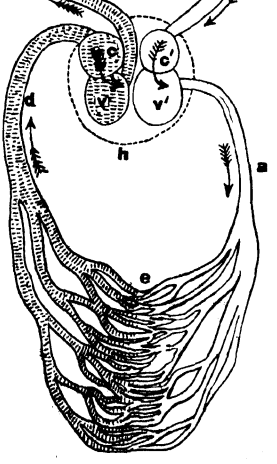


FIG. 1. Circulation of the blood: *h*, heart; *v*, right ventricle; *v'*, left ventricle; *c*, right auricle; *c'*, left auricle; *a*, aorta; *d*, vena cava; *e*, greater circulation; *b*, smaller circulation; *f*, pulmonary artery; *g*, pulmonary veins.

tion drives the blood to the lungs in the direction of the arrow pointing to *f*. The blood is prevented from returning into the auricle by the tricuspid valve, which completely closes the auriculo-ventricular opening during the contraction of the ventricle. In its passage through the lungs the blood is purified and oxygenated, and then is brought back to the heart by the four pulmonary veins, entering the auricle on the left side. When this contracts, the blood is forced into the left ventricle, and then by ventricular contraction into the aorta. The mitral valve prevents regurgitation into the left auricle, and the semilunar valve at the beginning of the aorta stops any reflux into the ventricle. Similar valves are present in the pulmonary artery. The aorta divides into branches, and these in turn into smaller ones, until the

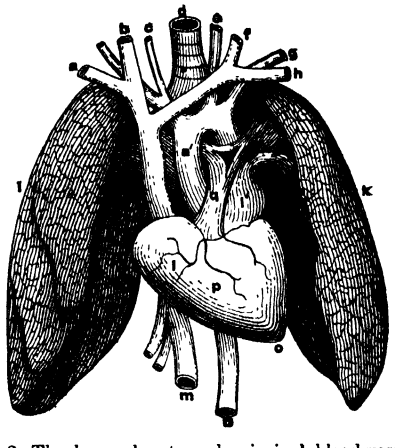


FIG. 2. The lungs, heart, and principal blood vessels in man: *a*, *h*, veins from right and left arms; *b*, *f*, right and left jugular veins, returning the blood from head and neck. These four veins unite to form a single trunk, the superior vena cava, which enters the right auricle, *l*; *c*, *e*, the right and left carotid arteries, the latter rising directly from the arch of the aorta, *a'*; the former from a short trunk called the arteria innominata; *g*, the left subclavian artery, rising directly from the aorta, while the right subclavian artery rises from the arteria innominata; *d*, the trachea or windpipe, *i*, *k*, right and left lungs; *l*, *l*, the right and left auricles; *p*, the right ventricle; *o*, the apex of the ventricle, *m*, the inferior or ascending vena cava; *n*, the descending aorta, emerging from behind the heart; *q*, the pulmonary artery.

whole body is supplied by a minute arterial plexus, or network; the smallest arteries divide into a finer network of still more minute vessels, the capillaries, which have extremely delicate walls, so that the blood can come into the closest relation with the cells of the body tissues. It is in these capillaries that the oxygen is given off, the nourishment furnished to the body elements, and the waste products taken up into the blood. The capillaries then unite to form a venous plexus, and later small veins which unite with each other to form larger ones, until all the blood is finally collected into the superior and inferior venæ cavæ, and thus brought to the heart again.

Thus there are in reality two circulations—one, a short circuit, from the right side of the heart through the lungs to the left side of the heart; and the second, a longer circuit, from the left side of the heart through the body back to the right side of the heart. In the heart the two circulations connect with each other and become continuous. In addition to the *pulmonary* and *systemic* circulations, described above, we have another subsidiary to the venous system, and known as the *portal circulation*. This is not indicated in the diagram. A certain amount of the blood of the intestines is collected into the portal vein and carried to the liver, where it traverses a capillary network in intimate relation with the liver cells. Bile is formed and other important changes are effected in the blood, which is highly charged with foodstuffs recently absorbed in its passage through the intestinal capillaries. The blood is collected a second time into veins, and carried to the inferior vena cava, where it again joins the general circulation. In its passage through other special organs the blood undergoes further modifications. See BLOOD PRESSURE; KIDNEY; SPLEEN; ETC.

The anatomy of the organs concerned is given elsewhere; they are here considered only in their mechanical relation to the circulation. The heart is situated in the anterior part of the chest, lying between the right and left lungs, and inclosed in a membranous sac (the pericardium), which consists of an outer fibrous layer and an inner serous lining. The fibrous layer is continuous with the outer coat of the large vessels, which enter and leave the heart; but the serous layer is reflected from these vessels on to the heart itself, which it entirely envelops. We thus have two sacs, the one within the other, but continuous with each other at their necks, and between the two sacs a closed cavity, secreting just enough fluid to lubricate its walls. Within this cavity the heart moves freely and with the minimum of friction. The shape of the heart is pyramidal; it is suspended nearly in the midline by the large vessels at its base, which firmly fix this portion; but otherwise the organ lies wholly free in the pericardium in a direction obliquely downward and to the left. The walls of the heart are almost entirely muscular, and the fibres are so arranged that by their contraction they diminish each cavity in all dimensions and drive the blood forward with great force. The work accomplished by each contraction of the two ventricles together is estimated at about 4.5 foot pounds. On this basis Houghton computes the total work of the heart in 24 hours at approximately 124 foot tons, or over 7.5 horse power.

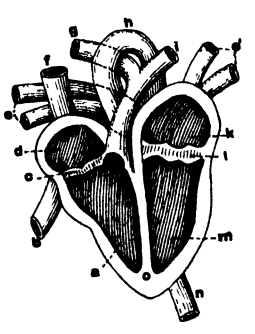


FIG. 3. Section of the human heart. *f*, *b*, the two vena cava opening into *d*, the right auricle; *a*, the right ventricle, from which proceeds the pulmonary artery, dividing into branches *g* and *i*, going to the right and left lungs respectively; *e*, *e'*, the pulmonary veins (two from each lung) entering into the left auricle, *k*; *l*, the mitral valve; *m*, the left ventricle, from which proceeds the aorta, whose arch is indicated by *h* and the descending portion by *n*, none of its branches being shown in this figure; *o*, the partition or septum between right and left hearts; *c*, the tricuspid valve.

In our outline of the circulation we have seen how the direction of the blood current in the heart is rendered constant by means of the cardiac valves. The heart's action consists in successive alternate contraction (systole) and re-

laxation (diastole) of the muscular walls of the auricles and ventricles. During the period of relaxation the blood flows into the two auricles from the veins, and they are gradually distended, while a certain amount of blood passes on into the ventricles through the auriculo-ventricular openings, which are patent during the entire diastole. At the end of this period the auricles are completely dilated, and their muscular walls contract and force nearly the entire contents into the ventricles. This action is very sudden, and occurs in both auricles at the same moment.

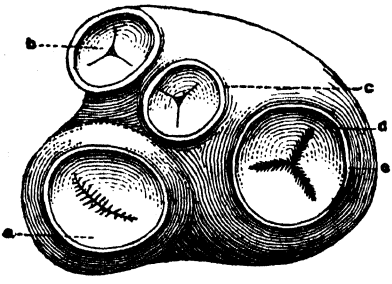


FIG. 4. Upper surface of the heart, the auricles having been removed.

The contraction begins near the entrance of the large veins and extends onward towards the auriculo-ventricular openings; in this way the reflux of blood into the veins is guarded against, and any tendency is still further counteracted by the mass of blood in the veins and by the valves which are present in the veins near their opening into the heart. The force of the blood flowing into the ventricles is insufficient to open the semilunar valves, but distends the ventricles themselves, which are still in a condition of relaxation. The tricuspid and mitral valves float upward on the blood current, and are in a position to close readily at the commencement of ventricular contraction. The ventricular systole follows immediately on the auricular systole. The contraction is slower, but far more forcible, and entirely empties the ventricular chambers at each systole. The apex of the heart is thrown forward and upward with a slight rotatory motion, and this impulse (the apex beat) is detected between the fifth and sixth ribs, slightly to the right of the left nipple. For a short time following the ventricular systole the whole heart is at rest. The entire cycle, therefore, can be divided into three periods, in the first of which the auricles contract, in the second the ventricles contract, and in the third both auricles and ventricles remain relaxed and at rest.

When we listen to the heart we hear two sounds with every beat, and these are followed by a short pause. We can roughly express their relative quality by speaking the words "lŭbb-dŭp." The first sound is dull and protracted, occurring at the same time as the apex beat, and coinciding, therefore, with the ventricular systole. This sound is supposed to be due to the vibration of the auriculo-ventricular valves and their fibrous attachments, and also, to a less extent, to the stretching of the ventricular walls and the coats of the large arteries by the tension at the moment of contraction. The contraction of the mass of ventricular muscular tissue is possibly a minor factor. The second sound is shorter and much sharper in character; it is probably dependent on the sudden closure of the semilunar valves. Diseases of the heart valves modify these sounds and enable one to detect the abnormal condition. In the healthy adult the heartbeats number about 72 per minute; but many circumstances, e.g., exercise, cause wide variations, even in health.

The arteries contain a considerable amount of elastic tissue which, by yielding, breaks the shock of ventricular systole, and thus protects the vessels from sudden pressure. This tissue also equalizes the blood current by its elastic recoil during cardiac diastole and forces the blood forward in a steady stream. It does not originate force, however, but simply restores the force expended on it by the contraction of the ventricles. Because of their elastic character, the arteries readily dilate and contract according to the total amount of blood in the body; the muscular tissue of the arteries is an additional factor here. The arteries also tend to regain their normal calibre under all circumstances, because of this same elasticity, and easily adapt themselves to the different movements of the body.

The most important function of the muscular tissue in the arteries is to adjust the size of the vessels to the amount of blood which each part of the body requires, and also to adapt the calibre to the quantity of blood that the arteries contain at any moment. The force of the muscular contraction in the arteries is probably a very slight factor in propelling the blood. The impulse of the blood, when it enters the arteries at the moment of ventricular contraction, can be felt in all the superficial arteries of any considerable size; and we designate this as the pulse. For clinical purposes it is usually felt in the radial artery at the outer side of the wrist.

In the mesentery of the frog we can trace the circulation in the capillaries by means of the microscope, and our observations here can probably, without error, be applied to the condition in man. The red blood corpuscles are seen moving along with considerable rapidity in the middle of the blood current, while the white corpuscles advance more sluggishly along the walls of the capillaries. The capillaries present a far larger surface with which the blood comes in contact than the other blood vessels, and therefore offer the greatest resistance to the progress of the blood. This resistance largely depends on the vital capillary force, so that the capillaries of themselves greatly influence the circulation. On the other hand, the condition of the arteries and veins exerts a decided control over the circulation in the capillaries which connect them. The propelling force in the veins is due to the impulse from the ventricles and, to some extent, to the pressure exerted upon the veins by the muscular movements of the body. The suction action of the heart is also a factor. The presence of valves along the veins enables them to take advantage of all the force applied. It is estimated that a portion of the blood can traverse the entire circuit of the circulation in half a minute. The circulation begins at a very early period in fœtal life and presents important modifications, which will be described under FŒTUS (q.v.). See also EMBRYOLOGY, HUMAN.

Our present knowledge of the circulation is of comparatively recent date. It was first described by Harvey, in his celebrated work, *Exercitatio de Motu Cordis et Sanguinis*, published in 1628.

CIRCULATION OF SAP. See SAP.

CIR'CULATO'RY SYSTEM, EVOLUTION OF. The organs by which fluids and sometimes gases and solids, suspended in the fluids, are transported from one part of the body to another. A circulatory system first becomes necessary when the organism gets to be of some size and a specialization of structure has taken place, so that the nutrient regions where fluid and gaseous food are supplied are far removed from the muscles, glands, and other organs which require that food, and where the excretory organs are distant from the great centres of metabolism. The circulatory system fulfills the function of transportation between the muscles and glands on the one hand, and the alimentary tract, respiratory organs, and kidneys on the other.

Lowest Forms.—In the Protozoa the body is so small that no special circulatory apparatus is necessary. The cell structure with its water spaces provides for carrying food in solution to the remotest plasm films. In the sponges the body often attains great size, but by the system of water canals penetrating all parts of the mass, food and oxygen are directly brought, as it were, to the door of every cell. Even in the Cnidaria the body wall is typically only two cells thick, so that between the external fluids and those of the cavity every cell is brought into direct contact with oxygenated water. In the Scolecida, where a true body cavity between the alimentary tract and the body wall makes its appearance, the fluids of this cavity serve to carry nutritive fluids and excreted products. The fluids of the body cavity are often set in motion by the cilia of the lining cells. In the Mollusca the body is so large and the muscular system so well developed that a more effective transporting system is necessary. This is gained by the separation of special tracts of the body cavity. In the dorsal part of the animal is a space that has gained thick muscular walls and constitutes a propelling organ or heart. The alimentary tract usually perforates the heart so that nutritive fluids by passing through the wall of the gut may reach the circulating fluid. From the heart a tubular space carries the circulating fluid to the spaces of the mantle and of the muscles and glands. These spaces are parts of the body cavity and, as in the case of the foot, some of them connect even with the outside world. The fluids in these spaces and in the gills make their way, in many cases at least, by the aid of cilia, to the heart. Oxygen is obtained both in the thin-walled mantle and in the gills. The Mollusca show thus a great advance in the specialization of a definite system of blood vessels. The echinoderms have acquired much the same or a less perfect system of blood spaces,

Annulosa.—Among segmented animals we find that many of the Polychæta have a well-defined system of blood vessels, which they have perhaps derived from the nemerteans. The system shows an advance over that of nemerteans, however; for in the latter group there is no regular circulation, whereas in the Polychæta such a circulation is established. They have a main dorsal vessel and a median ventral vessel, and a circular transverse vessel running in the body wall between the two. Vessels going to the alimentary tract get nutritive fluids, and those going to the body wall, parapodia, and gills bring back oxygen. The blood vessels contain corpuscles and often hæmoglobin. The dorsal-vessel "heart" contracts peristaltically. Not all Polychæta have a complete (closed) blood system, and in some cases the body fluid is the only circulating medium. The earthworms also have a well-developed system of vessels.

Arthropoda.—In the Crustacea there is a dorsal vessel, or "heart," but arteries and veins are often lacking, the heart pumping the general fluids of the body cavity. However, in the higher Crustacea, as, e.g., the lobster, definite vessels to the brain, muscles, gills, and alimentary tract appear, from which organs the blood is returned to the heart by blood spaces. In insects the respiratory functions of the circulatory system are largely replaced by respiratory tubes which ramify even to the muscles. There is always a heart, however, and in Arachnoidea a number of well-defined blood vessels.

In *Vertebrates* the organs of circulation are the heart, arteries, veins, and lymphatics. The heart is the central organ of the circulatory system. To it the blood is drawn by suction and is again forced out from it. The heart, as well as the rest of the vascular system, is of mesoblastic origin and appears close behind the gill clefts. Like the other large blood vessels, it is composed of layers: the outer (serous), the middle (muscular), and the inner (epithelium). Hence in origin the heart is a strongly developed blood vessel. Its complicated structure, such as occurs in the higher vertebrates, is the result of folding and swellings. The heart in the lowest of the vertebrates and in embryonic life is at first divided into two chambers with valves between them to prevent the blood from flowing backward again. One chamber, the auricle, receives the blood. The other, the ventricle, expels it to the body again. By further modification the sinus venosus develops at the venous end and the bulbus arteriosus at the arterial end. Such a condition of heart occurs at some time in the embryonic development of all vertebrates, and it is the permanent condition in many fishes. With the development of lungs, and consequently of the pulmonary artery and veins, the primitive heart is much changed. This change from gilled to lung-bearing condition may be studied in the embryonic development of all lung-bearing vertebrates. The heart of fishes is simple and, in structure, like the primitive heart described. It receives venous blood only, which it forces to the gills. In Dipnoi, where both gills and lungs exist side by side, the heart is halfway between that of fishes and amphibia. In amphibia the ventricle is single, and hence the blood in it is mixed. In many of the amphibia the ventricle is continued into a conus arteriosus, which is spirally twisted and contains a transverse row of valves. Among reptiles an incomplete ventricular septum exists in lizards, snakes, and turtles, but there is a complete one in crocodiles. The blood from the right ventricle passes into the pulmonary artery and into the left aortic arch. There are fewer valves in the heart and only one row at the beginning of the aorta and pulmonary artery. In birds and mammals there are two auricles and ventricles—that is to say, auricular and ventricular septa are complete. The ventricles are the larger and have more strongly developed walls. The blood from the head, heart, and body passes into the right auricle. In birds and mammals there is only one aortic arch. In birds it is the fourth right arch which persists, and in mammals the fourth

left. In the embryological development of birds and mammals the auricles are, for a time, in communication through the foramen ovale. Much variation exists among mammals in the mode of origin of the carotids and subclavians from the arch of the aorta. In branchial vertebrates the dorsal aorta is formed by the union above the gills of the branchial vessels. The allantois vein, which plays so important a part in reptiles and amphibia, is functional in birds and mammals only for a time in embryonic life, and from birds onward the hepatic-portal system supplants the renal portal.

The veins of vertebrates are provided with valves to prevent a back flowing of the blood.

The lymphatic system of elasmobranchs, amphibia, and, to some extent, of birds and reptiles, is provided with lymph hearts. In fishes and amphibia there are large lymph spaces, but from birds onward lymph vessels with well-defined trunks are present. The main lymph vessel is the thoracic duct, which empties in mammals into the left and in the Sauropsida into both the right and left branchio-cephalic veins. The lymph vessels, like the veins, are provided with valves which prevent a reflux of the lymph fluid. The lymph, like the blood, is composed of fluid and corpuscles. Lymphatic tissue occurs in fishes and amphibia, but lymph glands proper appear along the course of the lymph vessels, probably first in birds. In lymphatic tissue or glands the leucocytes, or white corpuscles of the blood, and lymph develop.

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CIR'CUMCEL'LIO'NES (Lat. nom. pl., from *circum*, around + *cella*, cell; also called in Med. Lat. *circelliones*, by popular etymology with Lat. *circellus*, circlet, dim. of *circulus*, circle). Fanatical Donatists of the fourth century, who got their name from their habits of wandering. They rambled over the country, plundering, burning houses, and murdering those who made resistance, saying that by such means they sought the crown of martyrdom. They styled themselves *agonistæ*, wrestlers, or soldiers of Christ, and called their chiefs the leaders of the sons of the Holy One. Constantine treated them with forbearance; but his successors, Constans and Constantius, put them down with a strong hand. The name was also applied in the thirteenth century to a sect of fanatical heretics in Swabia, partisans of the Emperor Frederick II.

CIR'CUMCIS'ION (Lat. *circumcisio*, from *circumcidere*, to cut around, from *circum*, around + *cædere*, to cut). The cutting away of the foreskin, a religious ceremony practiced by many peoples in different parts of the world, and going back to a very early period of human history. It is probably a substitute for an original phallic sacrifice. Among many races the custom of cutting off the phallus of their enemies has prevailed. It is significant that the ancient Egyptians performed this mutilation only in the case of enemies who were circumcised. In order to be cut off, the phallus must be clean, i.e., fit to be offered. The purpose of such an offering, presumably to some god of fertility, would naturally be to increase the fruitfulness of those making the sacrifice. Just as the sacrifice of the first-born was intended to insure the life of those born later, so the offering of the phallus of some youth was no doubt intended to increase the fertility of the tribe. The first modification of this rite seems to have been the substitution of gelding for the removal of the phallus, the object of emasculation being attained without the loss of life. The next step, at least in some cases, appears to have been such a painful mutilation as that which Niebuhr (*Beschreibung von Arabien*, 1772, p. 1269) learned to know between Hejaz and Abu-Arish, on the Arabian coast, consisting of an incision in the skin on the upper side of the penis, extending the entire length of the organ. While very dangerous, this operation offered a chance of both life and virility. To the same stage belongs, probably, the *arilltha*, or *mika*, practiced among the Australians, which consists of a subincision of the penis, so that the penile urethra is laid open from the meatus back to the junction with the scrotum. (Consult Spencer and Gillen, *The Native Tribes of Central Australia*, 1899, p. 263 and W. E. Roth, *Ethnological Studies among the Northwest Central Queensland Aborigines*, 1897, p. 178.) Finally, the removal of the prepuce was all that was required. In this form the mutilation was perpetuated either as a sign of the devotee, as a badge of priestly rank, or as a tribal mark. In the latter case it was generally administered as a sign of puberty and of capacity for participating in the cult, admitting the young man to the rights of cohabitation and of presenting sacrifices to the ancestors and the tribal gods. The rite retained somewhat of its sacrificial character even after it had been transferred to infancy, as was the case with some peoples. Generally the simple abolition of the prepuce was deemed sufficient. But after the Hellenized Jews had attempted to conceal their circumcision through the operation of epispasm, by which a plastic covering was effected (see 1 Macc. i. 15; 1 Cor. vii. 18; Josephus, *Ant.*, xii, 241, ed. Niese. Celsus, xxv, 1), the complete exposure of the glans was made an indispensable requisite to a valid circumcision. It is now universally recognized that this rite originated in religious considerations. Its value as a sanitary and prophylactic measure was probably not thought of as a reason for its observance until it was found necessary to defend it against the charge that it was a barbarous mutilation of the body. It chiefly consists in preventing masturbation and the carrying of disease through the retention of the smegma behind the glans.

From the representations of themselves on the walls of their caves it may be safely inferred that the men of the Magdalenian period of the Paleolithic age were not circumcised. But circumcision unquestionably

goes back to a period when the ancestors of the earliest civilized nations still walked about naked. (Stade, *Biblische Theologie des A. T.*, 1905, p. 147.) It seems to have been practiced already among the aborigines of the Nile valley, who probably belonged to the same race as the Libyans. A man belonging to this race, gored by a bull, on one of the oldest monuments is manifestly circumcised. (Consult *Bulletin des correspondances helléniques*, 1892, and Steindorff, in *Ægyptiaca*, 1897, p. 129.) The dynastic Egyptians were from the first familiar with the custom. Whether the rite was limited to the priestly classes or generally practiced among the Egyptians in earlier times is still an open question. As the poor could not afford to be mummified, we are dependent upon pictorial representations, and when naked fishermen, hunters, sailors, or shepherds are represented as circumcised, it may be maintained that they are temple slaves. On the other hand, the nobles and members of the middle classes did not, as a rule, allow themselves to be represented nude. There is, however, a statue of the priest Anisakha, shown nude and circumcised (see *Guide au Musée du Caire*, 1908, p. 30), from the sixth dynasty, and there is a statue of a king of the thirteenth dynasty, also showing him nude and apparently circumcised. (Consult Bissing, in *Sphinx*, 1908, vol. xii, p. 29.) In the case of the royal mummies there is only one clear exception to the rule that they are circumcised, so far as it is possible to examine them, and that is Thothmes II. The actual performance of the operation is set forth in a bas-relief from the twenty-first dynasty in a Theban temple (consult Chabas, in *Revue Archéologique*, 1861, p. 298) and on a sculptured doorpost in the necropolis of Saqqara from the sixth dynasty (consult W. Max Müller, *Egyptological Researches*, 1906, pp. 60 f., plate 106). Those operated on in the sixth-dynasty representation are evidently youths at the age of puberty. Naville and Wiedemann infer from the evidence that circumcision was neither widespread nor religiously important, while Wilcken holds that it was practiced by the whole people, and this view is supported by Bissing, Wendland, and Elliot Smith, at least so far as the mummified classes are concerned. Foucart also regards it as having had a marked religious significance and as having probably been obligatory on the priestly classes. It is intrinsically probable that the custom was in early times generally observed among all classes. If it were not so, it would be difficult to explain how, in Josh. v. 9, the Egyptians can be supposed to have reproached their Hebrew slaves with being uncircumcised, or why Herodotus (ii, 104) should not have mentioned that, in distinction from the custom in Syria, it was limited to the priesthood in Egypt, if he found it to be so. In recent years papyri have been discovered from the Græco-Roman period showing that in the second century A.D. the Roman government sought in every way to discourage the practice and was willing to issue a license only where it was absolutely necessary, as in the case of the priesthood. It seems to be through contact with Egypt, as Herodotus maintained, that Canaanites and Hebrews came to adopt the custom. Babylonians and Assyrians do not appear to have practiced the rite. It cannot be proved that the Moabites, Ammonites, and Edomites did so before their invasion of Syria. The Philistines were not circumcised. But they were Cretans (see CAPHTOR), and, according to Egyptian representations, the Mycenæan peoples were not circumcised. From the fact that this peculiarity of the Philistines is strongly emphasized by the Hebrews, it may be inferred that the Canaanites practiced circumcision. They may have derived the custom from some aborigines akin to the proto-Egyptians and the Libyans, or from Egypt in a later time. It is quite uncertain whether the clans that afterward formed the people of Israel knew the custom before they entered Palestine. The story in Ex. iv retains the memory that the Moses clan considered itself saved from threatening destruction by the adoption of this rite from their Midianite or Kenite neighbors. Yahwe seeks the life of Moses, but spares him when his Midianitish wife Zipporah circumcises their son and touches with the foreskin the genitals of Moses, exclaiming, "Thou art to me a bloody bridegroom." The sign of Cain (the Kenite) in Gen. iv has been thought by some scholars to be circumcision. (See CAIN.) This chapter seems to reflect an earlier attempt on the part of the Kenites to settle in Palestine. The people to which the Moses clan belonged do not seem originally to have had the custom. This apparently is also suggested in the story in Josh. v. Here all Israel is circumcised at Gilgal, upon "the hill of the foreskins," to remove "the reproach of Egypt" (verse 9), which seems to imply both a consciousness of the fact that Israel did not practice circumcision before settling in Palestine and knowledge of this as an Egyptian custom. That the youth of Benjamin were brought to the sanctuary called "the hill of the foreskins" to be circumcised there can be little doubt. But the shrine and the custom are likely to have been taken over from the Canaanites. No conclusion can be drawn from Gen. xvii, except that the fact that Ishmaelites practiced circumcision in the thirteenth year was traced back to the mythical ancestors of both Ishmaelites and Israelites. The story of Dinah in Gen. xxxiv suggests that the Hivites in Shechem were forced to accept circumcision by Israelitish tribes; but this may in reality show that the custom existed among the Hivites and had to be accounted for. It prevailed in some parts of Arabia before Mohammed, and, though not mentioned in the Koran, it has been retained by the nations accepting Islam. There is no serious objection to the assumption that everywhere in the Semitic world it goes back to Egyptian, and ultimately Libyan, influence. Whether the Colchians (Karki, Kashki) originally practiced circumcision—and this might be taken as an indication of its prevalence among kindred Asianic peoples—or it was brought to them in later times by colonists from Syria or Egypt cannot be determined. It still prevails among the Mandingos, Gallas, Falashas, and many Bantu tribes in Africa, where it cannot be traced back to Moslem influence. In Central America, and among the Aztecs of ancient Mexico, circumcision, or a somewhat similar mutilation, was practiced. It is still in use among the Teamas and Manaos on the Amazon. The Otaheitans and Tongas, some Melanesians in Polynesia, and nearly all tribes in Australia have this custom. In the present state of our knowledge a transmission of the rite through historic contact cannot be affirmed, and an independent development from the same social and religious considerations is most safely assumed.

Circumcision of females, consisting of mutilation of the clitoris, is practiced in Egypt, Abyssinia, West Africa, Arabia, and other countries. It was already known to Strabo, and it is referred to as a custom in Egypt in a Greek papyrus now in the British Museum. (Consult Müller, *l. c.*). As it is very generally found where male circumcision prevails, it is probably analogous in its history and development to the latter. The opposition to circumcision began with some of the Hebrew prophets (Jer. iv. 4; ix. 25–26). But it was the struggle reflected in the Pauline literature that eliminated this religious rite from the Christian usage, except in isolated instances, such as the Abyssinian church. Consult: R. Andree, "Die Beschneidung," in *Archiv fur Anthropologie*, vol. xiii, pp. 53 ff. (1880); Ploss, Geschichtliches und Ethnologisches über die Knaben-Beschneidung," in *Archiv fur die Geschichte der Medicin*, vol. viii (1885); Tomes, *Della circumcisione*, pp. 37–71 (1895); Salomon, *Die Beschneidung* (Brunswick, 1844); Glassberg, *Die Beschneidung* (Berlin, 1896); Zaborowski, in *Bulletin de la Société d'Anthropologie de Paris* (1893); Ploss-Bartels, *Das Weib* (9th ed., 1908, vol. i, pp. 261 ff.); Lewis Spence, *The Mythologies of Ancient Mexico and Peru* (1907); Wellhausen, *Reste arabischen Heidentums*, pp. 174 ff. (2d ed., 1897); Barton, *Semitic Origins*, pp. 98 ff. (1902); Lagrange, *Etudes sur les religions semitiques*, pp. 242 ff. (2d ed., 1905); Jaussen, *Coutumes des Arabes au pays de Moab*, pp. 363 ff. (1908); Wylde, *Modern Abyssinia*, p. 161 (1901); Risa, *Studie uber die rituale Beschneidung* (1906); Reitzenstein, *Zwei religionsgeschichtliche Fragen*, pp. 1–46 (1901); Wilcken, Gunkel, and Wendland, in *Archiv für Papyrusforschung*, pp. 4 ff. (1902); Wiedemann, in *Orientalistische Litteraturzeitung*, vol. vi, p. 97 (1903), vol. x, pp. 375 f. (1907); Naville, in *Sphinx*, vol. xiii, p. 220 (1909); Spiegelberg, *Tebtunis Papyri*, vol. ii, pp. 59, 63 (1907); Nicole, *Textes grecs inédits de la collection papyrologique de Genève*, p. 23 (1909); Kohler, "Circumcision," in *The Jewish Encyclopædia* (1903); Gray and Foucart, articles on "Circumcision," in *Encyclopædia of Religion and Ethics* (1911).

CIRCUM'FERENCE. See CIRCLE.

CIR'CUMFLEX (Fr. *circonflexe*, Lat. *circumflexus*, p.p. of *circumflectere*, to bend round, from *circum*, around + *flectere*, to bend). A mark used to denote an original rising and falling in the pronunciation of a long vowel. In Greek the signs used are ~ ^; in Latin the sign is ^. The last sign is sometimes used instead of the macron to denote simple length. As a sign of Greek accentuation it is used in certain cases to indicate the long vowel of the last syllable or of the penult of a word. The presence of a circumflex accent in a French word generally indicates that the vowel has been lengthened due to a contraction, a consonant, often an *s*, having originally stood between the vowel and the succeeding consonant; e.g., fête (feste), abîme (abisme), âpre (aspre), âme (anme). Hence the circumflex, or contracted, verbs, so called because of the circumflex accent which, in these French verbs, surmounts most usually, after the contraction, the last syllable of the first person of the present indicative.

CIR'CUMNUTA'TION (from *circumnutate*, from Lat. *circum*, around + *nutare*, to nod). A special case of NUTATION (q.v.).

CIR'CUMPO'LAR STAR (Lat. *circum*, around + *polus*, pole, axis). Any star which, in the apparent daily revolution of the sky, does not pass below the horizon of the observer; or, in familiar language, does not set. It will be remembered that the apparent daily motion of the stars is in reality the result of the actual rotation of the earth upon an axis which passes through the centre of the earth and a point in the sky, near the north or polar star, and that the lines in which the stars seem to move—called lines of diurnal motion—are the circumferences of circles perpendicular to this axis. If an observer is at the equator, the axis lies in the observer's horizon, the circles of diurnal motion are all perpendicular to the horizon, and all stars seem to rise and set. If the observer is at a distance from the equator—for example, in latitude 10° N.—the northern end of the celestial axis is raised 10 degrees above the horizon, and any star which is within 10 degrees of the north pole of the sky will not pass below the horizon in its apparent motion about the pole. The largest circle of the sky that can be drawn about the pole without passing below the horizon of the observer is called the circle of perpetual apparition. A similar circle drawn about the opposite pole, without coming above the horizon, is called the circle of perpetual occultation, and the stars within that circle are never visible to the observer.

CIRCUMSCRIBED AND INSCRIBED FIGURES. In plane geometry a curve is said to be circumscribed about a polygon when it passes through all the vertices of the polygon, and in that case the polygon is said to be inscribed in the curve. A polygon is said to be circumscribed about a curve when all of its sides are tangents to the curve, and in that case the curve is said to be inscribed in the polygon. Thus, a circle can be circumscribed about or inscribed in any regular polygon. Surfaces, too, may be circumscribed and inscribed; e.g., a pyramid whose lateral faces are tangent to the surface of a cone is a circumscribed pyramid, the cone being then inscribed in the pyramid. The mensuration of the circle, sphere, cone, and cylinder may be effected by means of circumscribed and inscribed figures, with the aid of the theory of limits (q.v.). Thus, the perimeters of the circumscribed and inscribed regular polygons of a circle may be computed, and the circumference be taken, as the limit of either as the number of sides is indefinitely increased. When the diameter is 1 unit, this circumference becomes 3.14159.... units, which number expresses an approximation of π. See CIRCLE.

CIR'CUMSTAN'TIAL EVIDENCE. Evidence of facts and circumstances which surround, and are connected with, the particular facts to be proved, and which, taken together, the court and jury may reasonably consider as tending to prove or negative the particular facts sought to be established in the case before them. Circumstantial evidence is most frequently called for in criminal cases; especially where the crime is secretly committed, as murder by poison sent by mail, in which case there is generally little positive and direct evidence that the accused committed the act with which he is charged. The circumstances precedent to and connected with a crime may so associate the accused with the crime that an inference of guilt would be the only one that could reasonably be drawn from such circumstances; in which case there

may be a conviction, even though there is no one who can testify, from actual knowledge, that the accused committed the act. See EVIDENCE.

CIR'CUS (Lat. *circus*, ring, circle). The name given by the Romans to the space in which they held horse races, chariot races, and, later, athletic contests and conflicts of wild beasts with one another or with men; they derived the name from the circuit made by the horses and the chariots as they raced. Many sports originally held in the Forum were afterward held in the Circus; in the Forum or in the Circus, for about two centuries, the contests took place which after the time of Julius Cæsar were held in the amphitheatre (q.v.). The Circensian games proper (i.e., horse and chariot races) were alleged by tradition to have originated in the time of Romulus, in honor of a Latin god Consus, identified, as a deity of horses, with Neptune. At these games, tradition further said, occurred the Rape of the Sabine Women. For these and similar games, later, a space was marked out in the long, narrow, level valley, between the Aventine and the Palatine hills, known as the Vallis Murcia; the horses and the chariots raced round an altar of Consus, which, save during the period of the games, was buried in the ground. This altar to Consus still existed in the time of Tacitus. Tarquinius Priscus, after capturing the Latin town of Apiolæ, gave Circensian games; at these for the first time, tradition said, wooden seats for spectators were constructed. Presently the games were held annually, and the tiers of wooden seats were made permanent and were periodically renewed. In 221 B.C. a second circus, the Circus Flaminius was built in the Campus Martius; henceforth the circus in the Vallis Murcia (see above) was known as the Circus Maximus. The wooden seats in the Circus Maximus were frequently burned and as often rebuilt; in the time of Julius Cæsar the lower seats were built of stone. Down to the time of Trajan, under whom this circus reached its greatest magnificence, the structure was several times rebuilt and the number of stone seats enlarged; the topmost portion, however, seems, even after this, to have been of wood. The masonry portions were covered inside and out by marble. In its final form, when the space for the spectators had been enlarged by additions on the slopes of the Aventine and the Palatine, the Circus Maximus, in its external dimensions, was about 2000 feet long by 625 feet wide; the arena was about 1850 feet long by 280 feet wide. In external appearance, as in the arrangements for ingress and egress of spectators, this circus finally resembled the Coliseum (see AMPHITHEATRE). There were three stories; the two lower stories had arches and engaged columns. The seats were in at least three groups, called *mœniana*, rising one above the other and receding from the arena; the *mœniana* were separated from one another by broad passages called *ambulacra* (walks) or *præcinctiones* (girdles). The front of each *mœnianum* was a high perpendicular wall; this was pierced by doors called *vomitoria*, which gave entrance from staircases and crypts, or corridors beneath the seats, upon the *ambulacra*. As in the amphitheatre (q.v.), the spectators were seated according to their rank; nearest the arena was a *podium*, as in the amphitheatre. Between the *podium* and the arena was a water channel, about 10 feet wide and 10 feet deep, called the Euripus, which was meant to protect the spectators from the attacks of wild beasts. At the western end, towards the Tiber, the Circus Maximus towered high, in several stories; this part was known as the *oppidum* (town). The *oppidum* was curved, forming the arc of a circle whose centre was on the starting line of the chariot races; in its lowest story were the barriers (*carceres*) within which the chariots were kept till the trumpet gave the starting signal. The chariots were thus equidistant from the starting line; there were no handicaps. The other end of the *cavea*, or auditorium, formed a wide arc with a short radius; here was the Porta Triumphalis, by which processions entered the circus. Above the *carceres* were two boxes, one for the judges, the other for the presiding magistrate (*editor*). From the time of Augustus there was on the Palatine side a box (*pulvinar*) from which the Imperial household could view the games.

Each *mœnianum* was cut into *cunei* (wedges) by numbered flights of steps, as in the amphitheatre and the theatre; each line of seats (*gradus*) was numbered. The amount of space granted to each spectator on the *gradus* was marked off by lines. According to one ancient authority the Circus Maximus contained, in Julius Cæsar's time, 150,000 seats; according to another it finally had 385,000 *loca*. Some modern authorities have interpreted the latter statement to mean 385,000 seats. An explanation accepted by many, however, is that there were 385,000 running feet of seats, which would give room comfortably for 250,000 spectators.

Through the major part of the arena ran the *spina* (backbone), a long, broad, wall which marked the arena off into two tracks for the races. On the *spina* stood two obelisks (one erected by Augustus, the other by Constantius; that erected by Augustus still stands in Rome, in the Piazza del Popolo, near the northern wall of the city). There was also on the *spina* an altar of Consus and other shrines. At each end was a shrine on which seven marble eggs were set at the beginning of the race; as a lap was run, one egg at each end was removed. Beyond each end of the *spina* stood three *metæ*, or conical pillars, of marble, which constituted the turning posts; each charioteer strove to reach the inside course and, to save distance and time, to turn as close as possible to the *metæ* (see Horace, *Odes*, 1, 1, 4).

In 221 B.C., as said above, the Circus Flaminius was built on the Campus Martius; this structure, which was much used, measured about 1000 by 400 feet. There was a circus of Caligula and Nero across the Tiber, near the Vatican; a circus of Hadrian, also across the Tiber, near his mausoleum; a circus in the gardens of Heliogabalus; and a circus of Maxentius on the Appia Via, about two miles south of the city. All these, at least in their final form, closely resembled the Circus Maximus. They all served as stone quarries down to the close of the Renaissance, so that few traces are left of any of them, except that of Maxentius. Drawings made of the Circus Maximus in the sixteenth century, when the structure was still well preserved, help to an understanding of its plan and general construction. Part of the exterior of the Circus Maximus is represented in a great oil painting, giving a bird's-eye view

of Rome in the fifteenth century; this painting, now in the museum at Mantua, is reproduced in facsimile in De Rossi's *Pianta di Roma Anteriore al XVImo Secolo* (Rome, 1879).

The circus was especially adapted for chariot races, an amusement of which the Romans became passionately fond, so much so that Juvenal (q.v.) declared that the Romans of his day cared only for *panis et circenses*, that is, free bread given by the government and the Circensian games (Juvenal, 10, 81). The race comprised seven circuits about the *spina;* from 10 to 20 races might be run in a day. The number of chariots (usually *quadrigæ*, four-horse chariots) was commonly four. Accidents were common; they are often represented on ancient monuments which portray the circus and its sports. The risk was increased by the fact that the charioteer (*auriga*) drove with the reins looped about his waist; that he might have some chance to cut himself loose he wore, within the loops of the reins, a curved knife. The charioteers were divided into four factions, or squadrons, named (*factio*) *albata, prasina, russata,* and *veneta,* from the white, green, red or blue colors worn by the charioteers, on cap or jacket. Bets and party spirit ran high, and the victor received a substantial pecuniary reward. Athletic exercises, when given in the circus, may well have been held in the large open space between the *carceres* and the *spina.* The *ludus Troiæ* was a mock conflict between young men on horseback. A regular battle was sometimes represented (*pugna equestris et pedestris*). By the formation of canals and the introduction of vessels, a *naumachia* or sea fight was occasionally exhibited; but under the Empire this form of exhibition as well as the *venatio* (contests of beast against beast, or of men against wild beasts) was gradually transferred to the amphitheatre (q.v.). (See also NAUMACHIA.) In providing for the *venatio,* vast sums of money were expended. Animals were procured from every available part of the Empire, including Africa and Asia. The exhibition afforded not only an opportunity for a display of private munificence and ostentation, but attained the importance of a political engine which none who aspired to popularity overlooked. When Pompey opened his new theatre, in 55 B.C., he is said to have given public exhibitions in the Circus for five days, during which time 500 lions and 20 elephants were destroyed.

Consult Friedländer, in Marquardt's *Römische Staatsverwaltung,* vol. iii (2d ed., Leipzig, 1885); the well-illustrated article "Circus," in Smith's *Dictionary of Antiquities,* vol. i (3d ed., London, 1890); the article "Circus" in Pauly-Wissowa's *Real-Encyclopädie der classischen Altertumswissenschaft* (Stuttgart, 1899); Lanciani, *Ancient Rome in the Light of Recent Discoveries,* 213 ff. (New York, 1889); Platner, *The Topography and Monuments of Ancient Rome* (2d ed., New York, 1911); Friedländer, *Roman Life and Manners under the Early Empire,* vol. ii (London, n. d.), a translation of Friedländer's *Darstellungen aus der Sittengeschichte des Roms* (7th ed., Leipzig).

CIR'CUS FLAMIN'IUS. A circus built about 221 B.C. in a part of the Campus Martius, called Prata Flaminia, by the Censor Gaius Flaminius Nepos, who was killed in 217 B.C. at Lake Trasimenus. Its central position made it the frequent scene of public meetings and fairs; and in it, according to Sallust, took place Sulla's massacre of 4000 prisoners in 82 B.C. The open space of the circus was used as a ropewalk in the Middle Ages, and the arcades as lime burner's kilns. All the remains have disappeared.

CIRENCESTER, sīz'e-tĕr, sīs'e-tĕr, *and* sīs'ĭ-tĕr (AS. *Cirenceaster, Cyrenceastere*). A market town in Gloucestershire, England, on the Churn, a branch of the Thames, and on the Thames and Severn Canal, 17 miles southeast of Gloucester (Map: England, E 5). It has a large trade in agricultural produce, and is an important wool market. There are also two breweries. In the neighborhood are the well-known Royal Agricultural College, with a farm of 500 acres, 450 of which are arable, and Oakley Park, the seat of Earl Bathurst. Cirencester was the Roman *Corineum,* at the junction of the Fossway with branches of the Icnield and Ermin roads, and has traces of ancient walls two miles in circuit. Roman relics found here, such as coins, urns, etc., form an interesting collection in the local museum. Rupert stormed Cirencester in 1642, but in 1646 it was given up to the Parliament. Pop., 1901, 7500; 1911, 7631.

CIRILLO, chē-rēl'lō, DOMENICO (1739–99). An Italian naturalist and patriot, born in Grumo. He was early called to a chair of botany in Naples, afterward accompanied Lady Walpole to France and England, and on his return to Naples was appointed professor of medicine. He enjoyed the friendship of Buffon, Diderot, D'Alembert, and Franklin. When the French established the Parthenopean Republic in Naples, in 1799, he was chosen a representative and became president of the Legislative Commission. After the reëstablishment of the royal government he was sentenced to death, and, stubbornly refusing to ask for mercy, was hanged Oct. 29, 1799. His works on botany (1787) and entomology (1787) are no longer valuable. Consult Giglioli, *Naples in 1799* (London, 1903).

CIRL BUNTING, sĕrl bŭn'tĭng (Neo-Lat. *cirlus,* from It. *zirlo,* whistling, *zirlare,* to whistle, Sp. *chirlar,* to twitter). A small and very handsome European bunting (*Emberiza cirlus*), rare and local in England, often kept as a cage bird, though its song is slight.

CIRPAN, chĭr-pän'. A town of eastern Rumelia, Bulgaria, on the tributary of the Maritza, 30 miles east of Philippopolis (Map: Turkey in Europe, E 3). It is situated in a fertile fruit-producing region, and is noted for its mineral springs. Pop., 1900, 11,760; 1910, 11,863.

CIRQUE, sĕrk (Fr., circle). The name applied to basins occurring in mountainous regions at the head of narrow stream valleys and gorges. They are characterized by precipitous walls, which curve around in a semicircle, forming a natural amphitheatre. Their origin may be traced to the erosive action of converging glaciers and streamlets. See CORRY.

CIRRHO'SIS (Neo-Lat., from Gk. *κιρρός, kirrhos,* tawny). A pathological change of tissues, consisting of hardening due to increase of connective tissue. It may occur in lung, spleen, ovary, heart, stomach, and peritoneum, but is oftener found in kidney or liver. *Cirrhosis of the kidney* (chronic diffuse inflammation of the kidney, or chronic interstitial nephritis) is a chronic inflammation of the connective-tissue elements of the kidney. In any animal tissue

subject to long-continued irritation and congestion, there is an escape of connective-tissue cells into the surrounding tissues (termed round-cell infiltration). These cells grow into connective-tissue fibres, which, as they multiply, crowd out the parenchymatous or functional elements of the organ, a process furthered by the inherent tendency of connective tissue to contract. This is the essential pathological change where cirrhosis takes place, whether in the lungs, spleen, ovary, kidney, or liver. Cirrhosis of the kidney, or chronic interstitial nephritis, is such a pathological process, resulting in a gradual substitution of fibrous tissue for the functionating elements. (See BRIGHT'S DISEASE.) *Cirrhosis of the liver*, or chronic interstitial hepatitis, consists in an overgrowth of the connective-tissue elements of the liver, at the expense of the true hepatic cells. The new tissue usually follows the line of the old connective tissue, but may penetrate the lobules. It is often irregular in its distribution. During the early stages the liver tends to enlarge, sometimes weighing 8 to 10 pounds (hypertrophic cirrhosis). Later, the connective tissue tends to contract, and the liver becomes smaller than normal (atrophic cirrhosis). The surfaces of the large livers are usually smooth, while the irregular contraction of the connective tissue in the atrophic livers squeezes the lobules, and usually results in nodular surfaces. The new connective tissue, besides causing atrophy of the liver cells, often compresses branches of the portal or hepatic veins and of the gall ducts, thus interfering with the nutrition of the liver cells, and causing stoppage of the bile current. Dependent upon the condition in the liver and the consequent disturbance of the portal circulation, various secondary lesions occur, such as dilatation of the veins, dropsy, œdema of the feet and legs, etc. Cirrhosis of the kidney and arteriosclerosis (q.v.) are frequently associated with cirrhosis of the liver, probably dependent upon the same obscure cause. See LIVER; ALCOHOLISM; DROPSY.

CIR'RHUS. A tendril (q.v.).

CIR'RIPE'DIA (Neo-Lat. nom. pl., from Lat. *cirrus*, a lock, curl + *pes*, foot). An order of small marine crustaceans (barnacles), characterized by their fixed life. The body is indistinctly segmented, attached by the head end, and surrounded by a mantle. The limbs of the trunk, six pairs (rarely less or more), are biramous, long, and tendril-like, and the circulatory system is wanting. The species are mostly hermaphroditic. The Cirripedia are closely allied to the Entomostraca. See BARNACLE, and Plate of BARNACLES. For a description of fossil forms, see CRUSTACEA.

CIR'RUS. See CLOUD.

CIRTA, sĭr'tà (Lat., from Gk. Κίρτα, *Kirta*, Phœn. *kereth*, Heb. *qiryat*, city). A city of northern Africa, the capital of the Numidian Prince Syphax, and an important fortress of Masinissa and his successors. Later it became a flourishing Roman colony, and the centre of Roman military roads in Numidia. It was much injured by the troops of Maxentius in 310 A.D., but was restored by Constantine and named Constantina. The modern Constantine occupies its site.

CISAL'PINE REPUBLIC (Lat. *cisalpinus*, from *cis*, on this side + *Alpes*, Alps). The name given to the state constituted in 1797 by the union of the Cispadane and Transpadane republics (respectively south and north of the Po, Lat. *Padus*), which had been established by Bonaparte in May, 1796, after the battle of Lodi. The Cisalpine Republic embraced Lombardy, Mantua, Bergamo, Brescia, Cremona, Verona, and Rovigo, the Duchy of Modena, the Principality of Massa and Carrara, and the three legations of Bologna, Ferrara, and the Romagna. The Republic had a territory of more than 16,000 square miles and a population of 3,500,000. Milan was the seat of the government, or directory. The Legislative Assembly was composed of a Senate of 80 members, and a Great Council of 160. The army consisted of 20,000 French troops, paid by the Republic. A more intimate connection was formed in 1798 between the new Republic and France, by an offensive and defensive alliance. The Republic was dissolved for a time in 1799 by the victories of the Russians and Austrians, but was restored by Bonaparte, after the victory of Marengo (1800), with some constitutional modifications and an increase of territory. In 1802 it took the name of the "Italian Republic," and chose Bonaparte for its President. A deputation from the Republic, in 1805, conferred on the Emperor Napoleon the title of King of Italy—after which it formed the Kingdom of Italy till 1814. See ITALY; NAPOLEON I.

CIS'CO. The name of two separate species of whitefish: (1) the lake moon-eye (*Argyrosomus hoyi*) of the Great Lakes—the smallest and most brightly colored of the whitefish; (2) the lake or Michigan herring (*Argyrosomus artedi*), occupying lakes in shallow places from Wisconsin to Alaska. Both are excellent food fish. See WHITEFISH.

CIS'IUM. See CARRIAGE.

CISLEITHANIA, sĭs'lī-thā'nĭ-à *or* -tà'nê-à (Neo-Lat., from *cis*, on this side + Ger. *Leitha*, a little river which forms part of the boundary between Austria and Hungary), or CISLEITHAN AUSTRIA. A name applied to that portion of the Austro-Hungarian monarchy represented in the Reichsrat in Vienna. It contains nearly 116,000 square miles and had a population of 26,150,708 in 1900 and 28,571,934 in 1910, or considerably more than half of the total population of Austria-Hungary.

CISPADANE (sĭs-pā'dān) **REPUBLIC.** A republican state of Italy, which comprised Modena, Reggio, Ferrara, and Bologna. It was merged in the Cisalpine Republic (q.v.) in 1797. It took its name from the Padus, or Po, which divided it from the Transpadane Republic. It was established in 1796 by Napoleon I after the battle of Lodi.

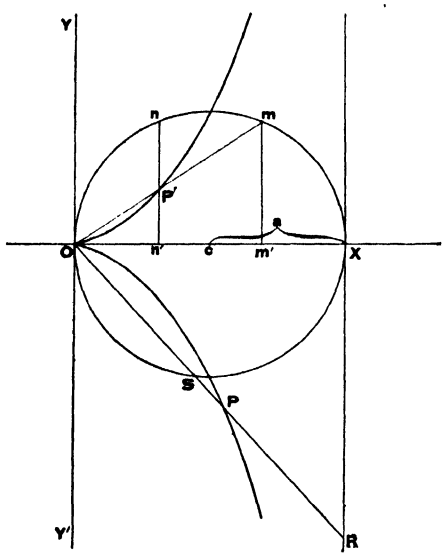
CISPLATINE (sĭs-plā'tĭn) **REPUBLIC** (Sp. *República Cisplatina*, from Lat. *cis*, on this side + Sp. *Plata*, the river dividing Uruguay from the Argentine Republic). The name of the Republic of Uruguay from 1828 to 1831. It had previously belonged to Brazil and had borne the name of the Cisplatine Province.

CISSAM'PELOS (Gk. κισσάμπελος, *kissampelos*, from κισσός, *kissos*, ivy + ἄμπελος, *ampelos*, vine). A genus of plants of the family Menispermaceæ, of which some of the species possess valuable medicinal properties, particularly *Cissampelos pareira*, a native of the West Indies and South America, the root of which was formerly thought to be that called Pareira brava. The plant is called "velvetleaf" in the West Indies, from the peculiar and beautiful appearance of the leaves. It is a climbing shrub, with round leaves, racemes of small yellow flowers, and

small, hairy, scarlet berries. The root of *Cissampelos* appears in commerce in pieces of 2 or 3 feet long, varying ½ to ¾ inch in diameter, tough, but so porous that air can be blown from end to end of it. It is dark brown externally and light yellow within. It has a sweetish, afterward nauseous, taste; is used as a tonic and diuretic, appears to exercise a specific influence over the mucous membrane of the urinary passages, and is administered with advantage in chronic inflammation of the bladder. Formerly this plant was supposed to yield all of the Pareira brava on the market; but now it is rare, its place being supplied by the roots of *Chonodendron tomentosum*, a plant of the same family found in Brazil, Peru, and elsewhere in South America. The root of this species, as found in the market, is of a grayish color, pale brown within, and with a waxy appearance when freshly cut. The roots vary from ½ inch to 3 inches in diameter, are longitudinally furrowed, and in sections show concentric markings. Another kind is also found in the American market, which greatly resembles *Cissampelos pareira*, but its exact botanical origin is not known. The properties of all are the same. They contain a bitter extractive and an alkaloid, pelosine or cissampeline, said to be identical with berberine and buxine. Pareira brava was introduced into European medicine in the latter part of the seventeenth century. In Brazil, in addition to its other uses, it is employed as a remedy for snake bites, a vinous infusion being taken internally, while the bruised leaves are bound over the wound.

CISSEY, sē'sā', Ernest Louis Octave Courtot (1811–82). A French general. He was born in Paris and was educated at the school of Saint-Cyr. Having served with distinction in Algeria and the Crimea, he was promoted in 1863 to be general of a division. He fought in the Franco-German War and in the contest against the Commune of 1871. He was elected to the National Assembly in 1871, was Minister of War from 1871 to 1873, in 1874–75 and in 1875–76, and was elected life senator in 1875. In 1880 he was accused of intimacy with a German spy, but was acquitted in 1881.

CIS'SOID (Gk. κισσοειδής, *kissoeidēs*, like ivy, from κισσός, *kissos*, ivy + εἶδος, *eidos*, shape, form). An ivy-like curve, first studied by Diocles, about 180 B.C. The commentary of Diocles sets forth the definition of the cissoid, which in modern notation will be understood from the figure. The ordinates mm', nn' are equidistant from the centre c, and the line Om cuts nn' in P', a point on the cissoid. A more general construction is the following: Draw any line OR from O to XR, and take $RP=OS$. Then P will be a point on the curve. The Cartesian equation of this curve is $y^2=\frac{x^3}{2a-x}$, and the polar equation is $r = 2a \tan \theta \sin \theta$. (See Analytic Geometry.) The curve passes through the points (a, a) and $(a, -a)$, is symmetric with respect to the X-axis, and lies between the Y-axis ($x = 0$) and the asymptote XR, whose equation is $x = 2a$; the origin is a cusp of the first species. (See Curve.) Huygens expressed the lengths (rectified it) of an arc of this curve limited by any two points in 1651. The area of the space included between the two branches and their asymptote was first given by Fermat (1661); it is equal to three times the area of the generating circle. If, instead of the circle, any other curve is taken as the generatrix, the resulting curve is called cissoidal. The cissoid is the pedal (see Curve) of a parabola with respect to the vertex. This curve has been used in solving two



famous problems of antiquity—the construction of two geometric means between two segments, and the duplication of the cube (q.v.). Consult: Klein, *Vorträge über ausgewahlte Fragen der Elementargeometrie* (Leipzig, 1895); translated by Beman and Smith, *Famous Problems of Elementary Geometry* (Boston, 1894); Gow, *History of Greek Mathematics* (Cambridge, 1884).

CIST, Henry Martyn (1839–1902). An American lawyer and soldier, born in Cincinnati, Ohio, of Russian descent, son of Charles Cist (1793–1868), a Cincinnati journalist. In 1858 he graduated at Farmer's (afterward Belmont) College. He joined the Sixth Ohio Volunteers upon the outbreak of the Civil War and advanced to the rank of assistant adjutant in the Department of the Cumberland, being on the staff of Generals Rosecrans and Thomas. He was corresponding secretary of the Society of the Army of the Cumberland from 1869 to 1892 and practiced law in Cincinnati. In addition to 20 annual reports of the society, and numerous articles in periodicals, he wrote *Life of General George H. Thomas* (in collaboration with Donn Piatt) and *The Army of the Cumberland* (1882), in the "Campaigns of the Civil War Series."

CIST BURIAL (Welsh *cist*, from Lat. *cista*, Gk. κίστη, *kistē*, chest). A mode of disposing of the dead among various peoples, chief among whom are certain American aborigines. A cell or box of stone slabs was placed in a shallow grave, and in this the remains were placed, usually folded into the smallest possible compass, sometimes denuded of flesh, together with the mortuary sacrifices; over these a broad slab was laid, and earth was spread above, sometimes in a mound. See Archæology, American; Mortuary Customs.

CISTER'CIANS. A branch of the Benedictine Order; also known as Bernardines, from their most famous member. It takes its name

from the mother house of Cîteaux (Lat. *Cistercium*), near Dijon, which was founded in 1098 by St. Robert, abbot of Molesme. He transferred 20 of his most zealous monks from the latter house, on account of the unhealthfulness of its site, and established a small and poor monastery at Cîteaux. Robert's successor, Alberic, obtained from Pope Paschal II a confirmation of the new foundation and drew up statutes which insisted on a strict observance of the Benedictine rule. A brown habit was at first worn; soon, however, perhaps to mark a contrast with the Cluniac Congregation, this was changed to white, with a brown, and later a black, scapular. Alberic died in 1109 and was succeeded by Stephen Harding, an Englishman. He pressed the rule of poverty to the utmost, applying it to the community as much as to the individual members. This extreme strictness diminished the number of postulants, so that the future looked unpromising, when in 1112 St. Bernard, with 30 companions, joined the struggling community. The numbers now began to increase, and Stephen was enabled within two years to found four other abbeys—La Ferté, Pontigny, Clairvaux, and Morimond. Fifty years later the order numbered 343 abbeys, and by the middle of the fourteenth century more than 700—in France, Germany, England, Ireland, Spain, Portugal, Norway, and Sweden. The austere and holy life of the early Cistercians won them universal respect and a vast influence throughout Christendom. They produced few great writers, but were indefatigable in collecting and copying manuscripts for their libraries. Practical matters, however, were not neglected in their zeal for literature and art; in England the order was a main cause of the growth of the wool industry.

After this golden age followed a period of decline. The rule was less strictly observed; many disorders crept in towards the end of the fourteenth century, and by the middle of the fifteenth the order had split into several congregations. The growth of luxury, the spread of the mendicant orders, and the practice of granting abbeys *in commendam* (see ABBOT) all contributed to its decay. Among the more noteworthy offshoots of the Cistercians were the Feuillants and the Trappists, and the Nuns of Port Royal in France. Before the Reformation England had 75 Cistercian monasteries and 25 nunneries. Among the English abbeys were Furness, Fountains, Woburn, Tintern, Kirkstall, and Rievaulx. Between internal decline and the hostility of various governments in modern times, the great majority of the Cistercian houses have ceased to exist. They are represented by a few in Italy, Switzerland, Belgium, and Austria, one in England (at Mount St. Bernard, near Leicester), and two in Ireland.

The influence of the Cistercians in art is sufficiently important to call for a separate treatment. When St. Bernard directed the policy of the order, he used it to carry out, among other things, his ideas as to the function of the fine arts. He wrote and preached against the current artistic extravagances in the construction, decoration, and furnishing of churches. As the order spread throughout the world during the twelfth century, it carried with it these ideas, some of which (for example, the invention of a single, low, wooden bell tower) were even expressed in the constitutions of the order. Cistercian artists, therefore, were architects, and of the constructive rather than of the decorative school. This is the only order that can boast of having consistently carried out an æsthetic ideal and had a style of its own, similar in whatever land it appears, and little affected by local art. Everywhere the order exercised a strong influence. The Dominicans and Franciscans borrowed from it many of the peculiar traits of their churches. The Cistercians adopted at once the vaulted type and were the pioneers of the Gothic revolution, carrying its germs, in Burgundian form, to nearly every civilized country. It was not until the middle of the thirteenth century that the order had largely yielded its simplicity to the advance of the rich and harmonious style of cathedral Gothic, though before that it had begun to change in minor ways, as in allowing the use of stone in place of wooden towers. When the special mission of the order was finished, its monasteries, being in remote country districts, were often allowed to go to ruin; but many of the most notable architectural monuments of its golden period remain worthy to stand by the side of the great cathedrals. Such are the abbeys of Maulbronn, Heiligen-kreuz, Lilienfeld, and Tischnowitz, in Germany and Austria; of Chiaravalle, Fossanova, and Casamari, in Italy; of Pontigny in France; Batalha in Portugal; Veruela in Spain, and those named above in England.

For the history of the order, consult: Janauschek, *Origines Cistercienses* (Vienna, 1877); Guignard, *Monuments primitifs de la règle cistercienne* (Dijon, 1877); D'Arbois de Jubainville and Pigeotte, *Etude sur l'état intérieur des abbayes cisterciennes aux XIIe et XIIIe siècles* (Paris, 1858); Tuite, *Cistercian Order* (New York, 1906). For the architectural side of the subject, Sharpe, *The Architecture of the Cistercians* (London, 1874); Eulart, *Origines de l'architecture gothique en Italie* (Paris, 1893); and the works named in the article on MONASTIC ART.

CIS'TERN (OF. *cisterne*, Lat. *cisterna*, reservoir, from *cista*, chest). An artificial reservoir, usually of masonry or woodwork, and located either above the ground, or, more commonly, in an excavation. In places where the supply of water is intermittent, or where rain water is used, every house requires a cistern, tank, or other receptacle for storing water. Where mosquitoes abound, especially the kinds which spread malaria and yellow fever, cisterns should be carefully screened or otherwise protected so that mosquitoes cannot deposit their eggs in the water. For comparatively large supplies of water, such as are required for manufacturing and railway service, receptacles for storing water are now almost universally termed reservoirs, tanks, or standpipes. See WATER WORKS; DAMS AND RESERVOIRS.

CIT'ADEL (Fr. *citadelle*, It. *cittadella*, dim. of *città*, a city, especially a fortified city). The fortified stronghold of a city or town; hence also the strongest part of any extensive fortification. Its function in ancient systems of fortification was akin to that of the donjon or keep of a castle; it provided a refuge of last resort for a garrison driven from the other works, in which they might hold out for a while longer against the enemy while awaiting succor from the outside. The mediæval citadel was accordingly situated, as a rule, at the most commanding and externally inaccessible angle of the city walls, with one gate opening towards the town and a

sally port towards the country. Modern warfare, with its long-range artillery and external lines of defense by earthworks and masked batteries, has rendered these old-time devices obsolete.

The term "citadel" is applied not only as above, to special portions of a system of fortifications, but also to any commanding and strongly defended castle or fort dominating a town, at once for defense and refuge. The acropolises of ancient Greece (as at Athens, Corinth, Tiryns, etc.) constituted the citadels of those towns. (See ACROPOLIS.) Edinburgh Castle, the ruined citadel castle of Smyrna, and the historic fortress of Antonia at Jerusalem (not extant) are examples of citadel castles in this sense. The fortified prison of the Bastile, in Paris, deemed impregnable until the Revolution of 1789, was the citadel of that royal capital. The fortified heights of Quebec are still called the Citadel. See CASTLE.

CITA'TION (ML. *citatio*, from Lat. *citare*, to call). A mandate of a court of competent jurisdiction, commanding the person or persons named therein to appear in that court for some purpose specified briefly in the citation.

It was originally the process by which a suit was begun in the English ecclesiastical courts, which formerly had jurisdiction over orphans, decedents' estates, and matrimonial causes.

In the United States the term is most frequently used to designate the process of surrogates', orphans', probate, and admiralty courts, commanding persons interested in a proceeding in such court to appear and show cause, if they have any, why the relief demanded by the party bringing the proceeding should not be granted, or for the purpose of receiving instructions, to make an explanation, or to show cause why they should not be punished for disobedience of some order, rule, or decree of the court.

The failure to obey a personal citation—that is, one for instructions or discipline—may render a party guilty of contempt of court; but if it is merely formal, notifying a party to appear and protect any interest he may have in a certain proceeding, appearance is not insisted upon, and the party failing to appear merely waives any right to object to the proceedings in which he is cited.

In Scotch practice, the act of an officer in summoning a party to an action under a proper warrant is called "citation." The term is also employed in the civil law.

The word "citation" is also used in law in the sense of the naming of an authority; as, the citation of a reported case or a passage in a legal treatise. See SUMMONS; SUBPŒNA; PROCEDURE.

CITHÆ'RON (Lat., from Gk. *Κιθαιρών, Kithairōn*). A mountain range in Greece, between Bœotia and Attica. The highest peak is a little over 4600 feet above sea level. It is now called Elatea, i.e., 'Pine Mountain.' It was famous in Greek mythology: on Cithæron Actæon and Pentheus met their fates, and Œdipus was exposed. Platæa lay at its foot.

CITH'ARA (Lat., from Gk. *κιθάρα, kithara*, a kind of lyre or lute). A musical instrument, somewhat resembling a guitar, much used by the Greeks and Romans, who attributed its invention to Apollo. In some respects it resembled a lyre; but it was played resting on the knees, whereas the lyre stood upright between them. The cithara had a hollow body, made sometimes of tortoise shell, from which two horns branched upward, supporting a crosspiece. The strings were stretched from this crosspiece to the body of the instrument, where they were supported by a bridge. Sounds on the lower strings were produced by the fingers of the left hand; on the upper, by the plectrum. From the cithara were derived the mediæval cither, and our modern



NUBIAN KISSAR, OR CITHARA.

zither and guitar. The modern instrument most nearly allied to the cithara is the Nubian kissar. See LYRE.

CITIES OF THE PLAIN. An appellation of the cities of Sodom and Gomorrah, which were situated in the plain about the Jordan and were destroyed because of their wickedness.

CITIUM. See LARNACA.

CIT'IZEN (OF. *citeain*, from Lat. *civitas*, state, from *civis*, citizen). In its most general sense, an individual member of a political society, or state; one who owes allegiance to, and may lawfully demand protection from, the government. The original meaning of the term, as denoting a person endowed with certain rights and privileges as a native or naturalized resident in a city, a free and lawful member of a civic community, has in America become its secondary signification; its Roman meaning, as a member of a free, self-governing commonwealth, having superseded it. It is in this latter sense, also, that it is employed in the French and Swiss republics. In England, however, it is properly employed only in the narrower sense, as equivalent to *municeps;* and this is its meaning, generally, in the law of modern monarchical states, in which the relation of the citizen to the state is expressed by the term "subject." In Imperial, as well as in Republican Rome, the state continued legally to be regarded as a commonwealth of free citizens, bound together by the tie of common membership of one body. The modern relation of sovereign and subject, which has been substituted for that of commonwealth and citizen, is of feudal origin, the oath of allegiance, on which it is based, being in its essence the creation of the

feudal obligation of fidelity and obedience due from a vassal to his lord.

It will be observed, then, that the more general sense of the term "citizen"—that in which it is employed in the United States and in other modern republics—is more closely in accordance with the original and historical meaning of the word. In the free republics of classical antiquity, the term "citizen" signified, not a resident of a town, but a free, governing member of the state, just as the term *civitas*, from which we derive our "city," signified, not merely a local municipality (*urbs*), but the state at large. The confusion is doubtless due to the importance of the rôle which several of these city states—as Athens and Rome—have played in history. In the ancient cities not all the inhabitants, perhaps not all the free inhabitants, were citizens, but these constituted a class entitled to special privileges and immunities; and as these cities formed the type of free government in the ancient world, the term "citizen" soon came to mean one who possessed full civil and political rights. The Greek idea of citizenship is expressed by Aristotle, who declared a citizen to be one to whom belonged the right of participating both in the deliberative or legislative and the judicial functions of the political community of which he was a member. The right was jealously guarded, and was rarely conferred on those of foreign birth. In Rome there were two classes of citizens—one that had a share in the sovereign power, i.e., were capable of attaining the highest offices of state; the other possessing only the private rights of citizenship. These, however, included the privilege of voting in the public assembly. There, as in the United States of America and some other modern states, citizenship, though usually acquired by birth, might be attained by naturalization or special grant of the state. In the later period of the Empire Roman citizenship, so highly valued under the Republic and early Empire, largely lost its distinctive character in consequence of the gradual disappearance of the political and legal privileges which formerly attended it. In the third century of our era the constitution, or decree, of Caracalla extended it to all persons, except slaves, freedmen, and their children, under the sway of the Empire, and Justinian completed the work by extending it to all free persons.

In the United States, as has been said before, the word "citizen" is used in its broadest sense, as defined at the beginning of this article. Perhaps as simple a statement as any is that made by an attorney-general of the United States, when he said: "The phrase, 'a citizen of the United States,' without addition or qualification, means neither more nor less than a member of the nation." The same person may be, and usually is, a citizen of the United States and of the State in which he resides. The two things are not, however, necessarily coexistent; for an inhabitant of one of the Territories or of the District of Columbia is a citizen of the United States without being a citizen of a State. The converse, however, is not true; no man who is not a citizen of the United States can be a citizen of one of the States. The idea of citizenship does not necessarily involve the right of voting or of other participation in political activity, as in the Greek conception of the term, for women and minors may be citizens, although excluded from all direct political activity. The question of race does not now enter into the definition of citizenship; previous to the adoption of the Fourteenth Amendment, this could not be stated, as the possession of negro blood was before that distinctly a disqualification from citizenship; yet even before the passage of the Fourteenth Amendment this position was doubted. The decisions denying the citizenship of Indians were founded not on race distinction, but on the existence of tribal relations, which were inconsistent with full allegiance to the United States.

A citizen of the United States may be either native-born or naturalized. Among native-born citizens are included all persons born in the United States and not subject to any foreign power, including even the children of alien parents, unless the latter be ambassadors of a foreign power, but excluding untaxed Indians still in tribal relations; children born in foreign countries of fathers who were citizens of the United States at the time of birth; freedmen not recognized as citizens before the Act of Emancipation, but so recognized by that act and by the ensuing Fourteenth Amendment; Indians born in the country who have abandoned tribal relations, have entered into civilized life, and have by paying taxes recognized their allegiance; and Indians who have accepted allotments of land in severalty under the Dawes Act of 1887.

We have already said that minors and women are citizens in the meaning of the term found in the United States Constitution; it is also true that wives of naturalized citizens become citizens by their marriage, if they were not legally incapable of naturalization. A naturalized citizen is one who was originally a subject of a foreign state, but who has been received by the United States as a citizen under the acts of Congress bearing on that subject. Theoretically, treatises on international law have always doubted the power of the subject to throw off his natural allegiance, and of a state to accept the allegiance of the subject of a foreign country. But these rights have been exercised very generally; and the right of naturalization is now recognized by treaties between the United States and many foreign powers. A person who is naturalized is admitted to all the privileges and duties of citizenship; and his naturalization includes that of any minor, but not of adult, children resident at the time in the United States.

In regard to the dual relation of citizenship in the general government and in the State in which a person resides, it may be said that a citizen of the United States owes his first and highest allegiance to the general government. The relations of the two forms of allegiance have been defined as follows by the United States Supreme Court: "There is in our political system a government of each of the several States, and a government of the United States. Each is distinct from the other, and has citizens of its own, who owe it allegiance, and whose rights, within its jurisdiction, it must protect. The same person may be at the same time a citizen of the United States and a citizen of a State; but his rights of citizenship under one of these governments will be different from those he has under the other. The government of the United States, although it is, within the scope of its powers, supreme and beyond the States, can neither grant nor secure to its citizens rights or privileges which are not expressly or by implication placed under its jurisdiction. All that cannot be so granted or secured are left to the exclusive pro-

tection of the States. A citizen of the United States owes his first and highest allegiance to the general government, and not to the State of which he may be a citizen." The word "citizen" is often loosely used as synonymous with resident or inhabitant. State laws conferring the franchise upon aliens who have filed declarations of intention to become citizens are often regarded as conferring citizenship. Where a law passed for a particular purpose makes such loose use of the word, and where no question of constitutional rights is involved, the courts will interpret the word. See ALIEN; ALLEGIANCE; NATURALIZATION; SUBJECT. Consult: F. Van Dyne, *Citizenship of the United States* (Rochester, 1904); J. S. Wise, *A Treatise on Citizenship* (Northport, 1906); W. L. Sheldon, *Citizenship* (Chicago, 1905).

CITIZEN, THE. A comedy by Arthur Murphy, performed July 2, 1761, at the Drury Lane Theatre, London, and printed (as a farce) in 1763. It is founded in part on Destouches's *Fausse Agnès.*

CITIZEN. See KASZTA AFFAIR.

CITIZEN KING, THE (Fr. *le roi citoyen*). An appellation bestowed upon Louis Philippe, King of France from 1830 to 1848. He had favored the revolutionary movement in his younger days and continued, even after he had mounted the throne, to sympathize with the people, though only in a half-hearted way.

CITIZENS INDUSTRIAL ASSOCIATION OF AMERICA. An organization founded on the belief that labor unionism has taken on certain features which operate injuriously to the general interest. The association vowed itself not opposed to labor unions, but opposed many of their practices, including the closed shop, limitation of output, boycott, sympathetic strikes, compulsory use of the union label, etc. There are over 500 local associations throughout the United States. The organ of the association is *The Square Deal.*

CIT'RIC ACID (Fr. *citrique,* Lat. *citricus,* from *citrus,* citron), $C_3H_4(OH)(COOH)_3 + H_2O$. A crystalline organic substance found in various plants, especially in the fruits of the lime (*Citrus bergamia*) and the lemon (*Citrus lemonum*). The citric acid of commerce is obtained from the lemon's juice, which is made in large quantities in southern Italy, in northern Africa, in the West Indies, etc. To obtain citric acid, lemon juice is boiled (to coagulate all proteid matter) and neutralized with chalk and lime; the precipitate of calcium citrate thus obtained is decomposed by boiling with dilute sulphuric acid; on filtering, and evaporating the filtrate, citric acid crystallizes out in the form of colorless rhombic prisms, freely soluble in water, and having an agreeable acid taste. Citric acid has the property of preventing the precipitation by potash or ammonia of the hydroxides of iron and certain other metals. This property is utilized in calico printing, citric acid being employed to prevent the formation of certain colors where they are not called for. Ammonium citrate, added to solutions of ferric salts, helps produce a smooth deposit of pure metallic iron by electrolysis. Citric acid is also used in making refreshing effervescent drinks; the pure acid, or preferably lemon juice (or orange juice), is very beneficial in scurvy; formerly it was popularly believed to be an excellent remedy for rheumatism; it is also used to increase the secretion of saliva and to allay thirst in fever. It is often used in medicine in combination with iron, magnesium, lithium, quinine, etc. Chemically, as its constitutional formula shows, it is a monoxy-tribasic acid, and is therefore capable of forming three series of salts, in which one, two, or all the three of the acid hydrogens are replaced by metals. It is somewhat similar to tartaric acid, from which it may, however, be readily distinguished by testing the solubility of its calcium salt, $(C_6H_5O_7)_2Ca_3 + 4H_2O$, which is insoluble in potash and is more soluble in cold than in hot water. Citric acid melts at 100° C. in its water of crystallization, which it loses at 130°. If heated further to 175° C., citric acid loses the elements of water, and is transformed into aconitic acid—an unsaturated tribasic acid, having the formula $C_3H_3(COOH)_3$. Citric acid was discovered by Scheele, in 1784; its properties were investigated by Berzelius and Liebig.

CIT'RIL, or CITRONENFINK (probably corrupted from *citrine,* Neo-Lat. *citrinella,* from ML. *citrinus,* citron colored, from Lat. *citrus,* citron; so called from the color of its breast). A small, canary-like finch (*Carduelis* or *Chrysomitris citrinella*), of southern Europe, related to the American goldfinch, and a favorite cage bird in Europe for the sake of its song.

CIT'RON (Lat. *citrus,* Gk. κίτρον, *kitron,* citron; possibly of Semitic origin; cf. Heb. *qātar,* Ar. *qatara,* to be fragrant), *Citrus medica,* var. *genuina.* (See CITRUS.) A tree, allied to the orange and lemon, cultivated in the south of Europe, and to some extent in Florida and California. It is a native of the forests of the north of India. The citron has oblong toothed leaves; the flowers are externally of a violet color; the fruit is large, warted, and furrowed; the rind is very thick and tender; the pulp is subacid. The part chiefly valued is the rind, which is candied, preserved, and used in confectionery and for culinary purposes. The juice is sometimes employed to make a syrup; or, with sugar and water, for a beverage and for flavoring liquors. The name "citron" is also applied, in the United States, to a variety of melon resembling in appearance the watermelon, but having a firm, white, inedible core. The rind of this melon is used for preserves, like that of the true citron. See CITRUS; ORANGE; LEMON. For illustration, see Colored Plate of CITRUS FRUITS.

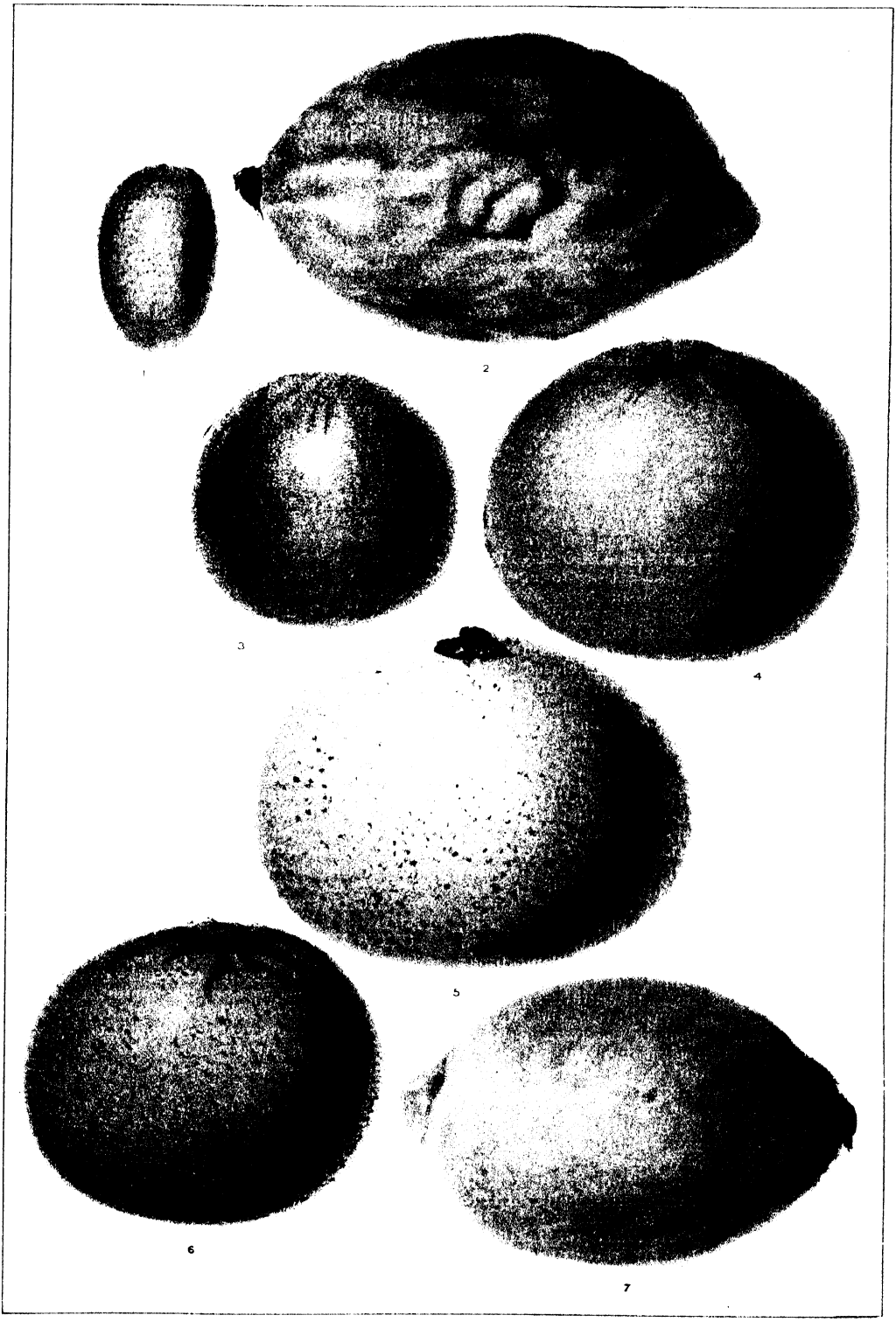
CIT'RONEL'LA (Neo-Lat., dim. of ML. *citro,* citron, from Lat. *citrus,* citron). The name of a fragrant ethereal oil imported from Ceylon, and used by perfumers. Under the name of *Idris Jaghi* it is often employed as an adulterant of certain aromatic oils. The application of citronella oil to the skin is recommended for keeping away mosquitoes and other insects.

CITRONELLE, sĭt'rō-nĕl'. A village and health resort in Mobile Co., Ala., 32 miles north by west of Mobile, on the Mobile and Ohio Railroad (Map: Alabama, A 4). Here, on May 4, 1865, Gen. Richard Taylor surrendered to Gen. E. R. S. Canby the last Confederate army east of the Mississippi. The Citronelle Chautauqua meets here. Pop., in 1900, 696; in 1910, 935.

CIT'RON MEL'ON. See WATERMELON.

CITRON WOOD, or CITRUS WOOD. The most costly furniture of Roman antiquity was made from this wood, which is probably the *Callitris quadrivalvis*—a tree of the pine family, still employed in cabinetmaking on account of

CITRUS FRUITS



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1 KUMQUAT NEARLY NATURAL SIZE CITRUS JAPONICA
2 CITRON ½ NATURAL SIZE CITRUS MEDICA
3 LIME NATURAL SIZE CITRUS MEDICA VAR. ACIDA
4 ORANGE ⅔ NATURAL SIZE, CITRUS AURANTIUM VAR. SINENSIS
5 POMELO ½ NATURAL SIZE CITRUS DECUMANA
6 MANDARIN ¾ NATURAL SIZE CITRUS AURANTIUM VAR. NOBILIS
7 LEMON ⅝ DIAMETER CITRUS MEDICA VAR. LIMON.

its beautiful grain. It grows in Algeria and has large and gnarled roots from which the pieces used for ornamental purposes are taken.

CIT'RUS (Lat., citron tree). A genus of plants of the family Rutaceæ, consisting of 30 or more species of trees and shrubs, most of which bear spines or thorns and are natives of India and other warm parts of Asia, but many of which are now commonly cultivated in all warm climates on account of their fruit. This genus includes the orange, citron, lemon, lime, bergamot, shaddock, pomelo, and forbidden fruit. Citrus trees are distinguished by numerous stamens, irregularly united in bundles by their filaments, a pulpy fruit with a spongy or leathery rind, and smooth seeds. The leaves and the rind of the fruit abound in volatile oil. The flowers also contain volatile oil and emit a peculiar fragrance.

CITRUS DISEASES. See ORANGE, *Diseases.*

CITTADELLA, chĕt'tä-dĕl'lä (It., little city, dim. of *città,* city). A city in the Province of Padua, north Italy, situated 14 miles northeast of Vicenza (Map: Italy, F 2). It has a beautiful church and botanical gardens, and manufactures cotton and woolen goods. It was founded in 1220, as a protection against Treviso, and has still retained its walls, tower, and moat. Pop., 1901, 9886; 1911, 11,332.

CITTÀ DI CASTELLO, chĕt-tä' dē kȧs-tĕl'lō (It., City of the Castle). A city in the Province of Perugia, central Italy, situated near the left bank of the Tiber, 20 miles east of Arezzo (Map: Italy, G 4). It is surrounded by walls of the sixteenth century, and contains several fine palaces, a cathedral of the sixteenth century, and beautiful town hall of the fourteenth century, containing a fine art collection. Although some of the first church pictures of Raphael were painted for Città di Castello, the town does not possess any originals of the master in its public collections. The chief manufactured products are silk and nails. Its commerce is of some importance. Città di Castello is the seat of a bishop, and occupies the site of Tifernum Tiberinum, destroyed by Totila. Pop., 1901, 26,439; 1911, 27,713.

CITTANOVA, chĕt'tä-nō'vȧ. A town in the Province of Reggio, Calabria, Italy, 31 miles northeast of Reggio (Map: Italy, L 9). It arose from the ruins of Casalnuovo, which was destroyed by an earthquake in 1783. Its present name dates from 1852. The cultivation of olives and manufacture of olive oil constitute its chief industry. Pop., 1901 (commune), 11,713; 1911, 15,145.

CITTÀ VECCHIA, chĕt-tä' vĕk'yȧ. Former capital of Malta, seven miles west of Valetta. It is more often known as Città Notabile. The palace of San Antonio, residence of the English governor, is near the town. Pop., 4000.

CITY (Fr. *cité,* Lat. *civitas*). In the United States, a chartered municipal corporation whose chief executive officer is usually known as the mayor. The legislatures of the various States have prescribed different requisites for the granting of city charters, the principal condition being that in respect to population. City charters vary in the degree of power they confer on the municipal authorities, the measure of local autonomy being usually, though not always, regulated by the number of inhabitants. Besides the mayor, there are, as a rule, a board of aldermen and a common council. In Great Britain the term "city" is generally applied to an incorporated cathedral town—i.e., one which is, or has been, the seat of a bishop or the capital of his see. In the sense in which it was first used in the Romance languages of modern Europe, the word "city," like its Latin original and the Greek πόλις, was probably equivalent to State (*respublica*), rather than to town or borough (*urbs, municipium*); and while the latter signified a collection of hearths and households, governed by municipal laws internally, but subject externally to the laws of the country of which it formed a part, the former was applied only to such towns as, with their surrounding districts, were independent of any external authority. The only cities in this sense now are the free towns of Germany and such of the cantons of Switzerland as consist chiefly of a town and its surroundings, as Geneva. The ancient Gauls, though composing one nation, were divided into tribes, living in different cantons, each with its town, to which the term "*civitas*" was applied; and as they also acknowledged a species of central authority, several cities sending delegates to a central one of greater extent and importance to discuss their common affairs, there is reason to believe that the term "city" was applied, par excellence, to those central places of meeting, and thus, from a very early period, signified a capital or metropolis, though not independent. See CITIZEN.

Political and Commercial Aspects. The city has always been the centre of commercial and industrial development, but its origin is to be found among agricultural peoples who possessed the fertile lands and built themselves walled towns, or took possession of some naturally fortified places, such as the Acropolis of Athens, in order to protect themselves from the attacks of the predatory tribes. Within the city, handicraft, exchange, and various industries grew up. Babylon and Egypt were full of these small communities, now buried beneath the sand. They were situated on rivers and the seacoast, and soon became centres of commerce. Large cities were a prominent feature of the ancient world; Thebes, Memphis, Babylon, Nineveh, Susa, Tyre, Carthage, and Jerusalem were great centres. Greece, for its extent and population, had many large cities. Alexandria is said to have contained over 500,000, and Rome was still larger. As capital of the Empire of the East, Constantinople succeeded Rome as the principal city in Europe. Civilization was associated with city life, as was illustrated by the use of the word "pagan" (Lat. *paganus,* dweller in a country district, where heathenism often survived much longer than in the city). In the Mohammedan East, during part of the Middle Ages, Bagdad, Damascus, and Cairo led in population, while Cordova was the greatest city of the Mohammedan West and for a time of all Europe. Compact cities grew up in the Middle Ages in nearly every European country. At the beginning of the sixteenth century, Europe had six or seven cities numbering 100,000; at the end, 13 or 14. During the seventeenth century, while civil war prevailed, although the population of Europe remained stationary, the cities increased.

A remarkable fact of the nineteenth century has been the constant increase in urban life at the expense of the rural districts. Cities have grown absolutely and proportionally in respect to the total population. This is true not only

of the countries in which industry is highly developed, like England, Germany, and the Eastern and Northern States of the American Union, but also of agricultural countries like western Canada, Australia, and Argentina. The movement towards the city made its earliest appearance in England. In 1851, 50.08 per cent of England's population was urban; in 1911, 78 per cent of the population of England and Wales lived in cities and towns. In Germany 54.3 per cent of the population lived in towns of 2000 and upward. In France over 40 per cent of the population dwell in cities. Approximately 40 per cent of the population of Belgium and Holland is found in cities; and even in Australasia, where the importance of agricultural and pastoral pursuits might be expected to lead to a dispersion of population, one third of the population dwells in cities and towns. In the United States a diffusion of the population would have seemed natural; but urban tendencies are becoming stronger, as this table shows:

YEAR	Total Population	Urban population—Cities of 2500+	Per cent of urban total
1880	50,155,783	14,772,438	29.5
1890	62,947,714	22,720,223	36 1
1900	75,994,575	30,797,185	40 5
1910	91,972,266	42,623,883	46.3

The most striking urban development naturally appears in the Eastern States. In 1910, 96.7 per cent of the population of Rhode Island lived in cities of 2500 and over; 92.8 per cent of the population of Massachusetts; 78.8 per cent of that of New York; 89.7 per cent of that of Connecticut.

The percentage of population living in cities and towns is least in the South—25.4 per cent for the South Atlantic States, 18.7 per cent for the East South Central, and 22.3 per cent for the West South Central. Even here, however, the tendency is unmistakable. The corresponding percentages for 1890 were 19.5, 12.7, and 15.1 respectively.

Another notable fact is that the population of the large cities is increasing even more rapidly than that of cities in general. In 1890 15.4 per cent of the population lived in cities of 100,000 and over. In 1900 the percentage was 18.8; in 1910, 22.1. Nearly one-tenth of the population of the United States is found in the three cities New York, Chicago, and Philadelphia.

Throughout the world the remarkable growth of great cities is of special significance, and also the manner of growth. There is great difficulty in comparing statistics because of the failure to distinguish the economic from the political unit. It is the territory economically dependent upon the large centre which continues to grow rapidly. The important point to be noted is, that the increased size of these cities is due to suburban extensions. The older portions of the city have the population displaced by business and improvements; rapid-transit facilities remove the residential portions to outlying districts, where better conditions are possible, and the congested wards do not grow except where a low class of immigrants appear. However, the incomers to the slums are largely balanced by the outgoers. Certain forms of industry are also moving to the suburbs.

The principal cause of modern urban growth is the development of mechanical industry, which gives the large city a technical advantage over the small. Conditions making urban growth possible have been the epoch-making improvements in transportation and the increased productivity of agricultural labor resulting from the application of machinery to agriculture.

A few of the effects of this agglomeration of population may be enumerated. (1) *Economic.* Great extremes of wealth are found in the cities, but the possibilities of greater production raise the average of prosperity and the standard of living. Increased taxation and municipal indebtedness make heavy demands upon the social purse. The cost of living is high, especially in rents, resulting in the horrors of overcrowding. Staples, however, are lower, and consumption can be greatly varied. The existence of an unemployed class is probably due to the immigration of a low class. Association is an aid to labor, in that it favors organization. (2) *Political.* Urban growth has meant national greatness. National stability was considered to depend upon the conservatism accompanying land tenure. As urban life increases, tenancy becomes more general; but the new forms of wealth have simply expanded property interests. Municipal government (q.v.) presents difficult problems. The population contains floating, nontaxpaying, and foreign elements; the opportunities for corruption are many, and the needs of administration require an expansion in governmental functions. (3) *Social.* Among the evils of city life are those of disease, infection, dirt, high death rate, infant mortality, overcrowding, lack of light and air, poor water, the fostering of daring criminals, the nervous tension of the life and the lack of provision for education and recreation, as well as the dangers of class antagonism. Industrial competition has weakened the tendency of cities to be the centres of radicalism, but association unconsciously strengthens social solidarity. A humanitarian movement is apparent, as instanced in philanthropic associations, while common interests have developed municipal activities broadly social in their nature. The cities are necessarily the centres of thought, culture, and progress. Urban life must be accepted as a prominent factor of civilization, whose evils are temporary and remediable. The old cities are in process of remaking; the solution of the problem is not a return to rural life, but a better adjustment to the urban environment. See MUNICIPAL GOVERNMENT.

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thold, *Geschichte der deutschen Städte und der deutschen Bürgerthums* (Leipzig, 1852–53); Friedländer, *Town Life in Ancient Italy* (Boston, 1906); Levasseur, *Les populations urbaines en France* (Paris, 1890); Kuczynsky, *Der Zug nach der Stadt* (Stuttgart, 1897); Weber, *The Growth of Cities in the Nineteenth Century* (New York, 1901); Meuriot, *Des Agglomerations urbaines dans l'Europe contemporaine* (Paris, 1897); Wilcox, *The American City* (New York, 1904); Howe, *European Cities at Work* (New York, 1913).

CITY HEIRESS, THE. A comedy by Mrs. Aphra Behn (1682), based upon Middleton's *A Mad World, My Masters*. The prologue was written by Otway.

CITY MADAM, THE. A comedy by Philip Massinger, licensed May 25, 1632, and printed in 1658. It was revived at Drury Lane, April 29, 1783. The doubt which has been raised as to its entire authenticity is unfounded.

CITY MATCH, THE. A comedy by Jasper Mayne, printed at Oxford in 1639 and produced the same year, first at Whitehall, London, before the King and Queen, and then at Blackfriars. It was republished in 1659 and was revised for the stage by Bromfield, in 1755, under the title of *The Schemers*, and by Planche, in 1828, under the title of *The Merchant's Wedding*. It is a clever though rather involved piece, criticized by Pepys as "silly."

CITY MOUSE AND COUNTRY MOUSE, THE. An old fable of a country mouse invited to the home of a mouse in the city, where, while feasting on unaccustomed dainties, she is terrified by the onslaught of a cat, and is led to esteem the security of her frugal life in the fields more highly than the town luxuries with their attendant perils. The fable is a satire by Matthew Prior (1687) on Dryden's *Hind and Panther*.

CITY NIGHTCAP, THE. A play by Robert Davenport, licensed for the stage in 1624, though not printed until 1661. Ten years later, an adaptation of the play, by Mrs. Aphra Behn, appeared under the title, *The Amorous Prince*. It is included in Dodsley's *Old Plays* (1740).

CITY OF A HUNDRED TOWERS. An appellation of Pavia, Italy, from its many towers and steeples.

CITY OF BROTHERLY LOVE. A nickname given to the city of Philadelphia, Pa. The name of Philadelphia in Asia Minor, whence William Penn derived the name for his city, was itself derived from that of Attalus Philadelphus; its Greek form was *Φιλαδέλφεια*. The nickname is due to an erroneous assumption that the original Greek name was *Φιλαδελφία* and was originally a common noun meaning "brotherly love" (compare Gk. *φίλος*, *philos*, dear + *ἀδελφός*, *adelphos*, brother).

CITY OF DAVID. Jerusalem, which David took from the Jebusites and made the capital of his kingdom. The term is applied also to Bethlehem, where David is supposed to have been born.

CITY OF DESTRUCTION, THE. The city from which Christian begins his journey to the Celestial City, in Bunyan's *Pilgrim's Progress*. It represents the state of worldliness.

CITY OF GOD (Lat. *De Civitate Dei*). See AUGUSTINE, SAINT.

CITY OF HOMES. An appellation of Philadelphia, from its large number of dwelling houses.

CITY OF MAGNIFICENT DISTANCES, THE. A term applied once somewhat derisively, but now proudly, to Washington, D. C. The city was laid out at the end of the eighteenth century on so grand a scale that the belief was strong that it would never realize the ideal of its founders.

CITY OF REFUGE (Heb. *'ir miglat*). A town reserved as a temporary asylum for homicides fleeing from the vengeance of the avenger of blood. The phrase refers particularly to the Jewish form of the right of asylum, which has existed, in most primitive societies, as a device for mitigating the excesses of private vengeance and for securing some form of legal inquiry into the offense charged. Such asylum, sanctioned and protected by law, is clearly a survival from the protection which the man slayer sought and found in his own family or tribe, early law permitting the *lex talionis*, or right of retaliation, on behalf of the injured family or tribe, so long as the malefactor was at large. Asylum once having been gained, the responsibility for the crime was transferred to the community protecting the wrongdoer, the compensation due being a money payment, the amount of which was regulated by law.

According to biblical law, there were six cities in which any one who committed murder unintentionally could find an asylum (Num. xxxv.). Three of these cities—Bezer, Ramoth in Gilead, and Golan in Bashan—were east of the Jordan; the other three—Kedesh in Galilee, Shechem, and Hebron—were to the west. If the murderer reached any of these cities, he was safe from the blood avenger (Num. xxxv. 12; Deut. iv. 41–43; Josh. xx. 2–9; Ex. xxi. 13; Deut. xix. 4–10). There are certain features of the law in Numbers which are unquestionably very old. The three refuge cities to the west of the Jordan are all ancient sanctuaries, and were probably, from a much earlier period even than the Hebrew conquest of Palestine, asylums under the protection of the deities worshiped in the places named. The city of refuge is thus an institution growing out of the ancient custom, widely prevalent, which made every sacred spot, every altar as the resting place of a deity, a place of refuge, within whose domain even animals were safe from the attacks of man. The oldest Hebrew legislation (Ex. xxi. 12–14) recognizes this law of asylum, while excluding from its protection the willful murderer, who is to be seized even at the altar of Yahwe (Ex. xxi. 14). Since it was the purpose of the religious reforms instituted by King Josiah (q.v.) to recognize the sanctity of only one sanctuary—that of Jerusalem—the asylums connected with the numerous sacred places naturally lost their force. Accordingly, to overcome the difficulty involved in obliging a murderer in any part of the country to flee to Jerusalem, the six cities above mentioned were recognized as places of refuge, with eventual provision of three more in Philistia, Phœnicia, and Cœle-Syria (Deut. xix. 8–10). In the legislation in Numbers (chap. xxxv), which is supposed by many scholars to be in its present form later than Deuteronomy, further provision is made: (1) The murderer is not to go unpunished, but is to be taken from his asylum to be tried in public, in order to check lawlessness, which prevailed through the survival of the blood-feud customs to a late day; (2) the manslayer who had been acquitted was safe, upon the death of the high priest in whose time

the murder was committed, to return to his home. All privileges of the blood avenger ceased with the death of the high priest, and any violence on the part of the blood avenger would be regarded as willful murder; whereas, previous to the death of the high priest, the manslayer, even after acquittal, had to be on his guard, and, if slain by the blood avenger, his death could not be punished. In the days of Greek and Roman supremacy many cities of Syria enjoyed special privileges as asylums. Among these were Gaza, Ashkelon, Dora, Ptolemais, and in the Decapolis, Hippus, Gadara, Abila, and Scythopolis. According to Josephus (*Ant.* xiii, 2, 3) Jerusalem was included in the number. The title ἄσυλος, *asylos*, implied above everything else freedom from the duty of extraditing fugitives who had sought refuge in these cities. Consult: Schürer, *Geschichte des jüdischen Volkes*, vol. ii, p. 105 (4th ed., 1907); Benzinger, *Hebräische Archäologie*, pp. 279 ff. (2d ed., 1907). See also Asylum, Right of; Blood Feud; Blood Money.

CITY OF THE PROPHET (Ar. *Madinat an-Nabī*). An appellation of Medina, Arabia, where Mohammed took refuge in the year 622, fleeing from Mecca.

CITY OF THE SUN, The. A name given to Baalbec, which was built on the ruins of Heliopolis ('The Sun City').

CITY OF THE VIOLET CROWN, The. A name applied to Athens.

CITY PLANNING is the designing and laying out of cities and towns to meet the manifold common public needs, including not only various physical necessities, comforts, and conveniences, but also the demands of the higher life. More specifically, the object of city planning is to arrange in one harmonious whole the streets, public buildings, parks, playgrounds, and amusement and recreation centres of a given city, and at the same time to provide adequate transportation facilities by land and water, proper water and light supplies, and sewerage and drainage systems. In its broader aspects city planning also includes a consideration of the proper housing of those classes of citizens who are unable to care for their own interests, as well as the division of the city into residential, industrial, and business districts. It should also take into account what the British town planners term the "amenities of city life."

The fundamental basis of city planning is utility. The greatest utility rests on fitness of form to purpose or function, and it is out of this adaptation that the æsthetic in city planning is developed. Adornment has a place in city planning, but it should be used chiefly to accentuate the beauty and dignity of natural form and to stimulate the civic spirit by well-designed and well-placed monuments, to commemorate epochal events and illustrious persons in the history of the city. The city plan should always express the individuality of the city, as regards both its topography and the life and spirit of its people.

It is apparent, from this survey of the scope of city planning, that its successful practice calls for the services of the landscape architect, the surveyor, the engineer, the architect, the sociologist, and the financier, as well as the real-estate developer. Unfortunately most of the city planning of to-day begins and ends with the speculator in real estate, who invokes the assistance of these other agencies only so far as to him seems necessary to realize the greatest immediate personal profit from his schemes for real-estate development. Such operations are directly opposed to the spirit of city planning. Real city planning looks to the interest of the public rather than the profit of the individual, to the development of the city as a whole, instead of the mere "improving" of isolated plots, to the needs of the future as well as the present good. It is not a matter of cutting up vacant tracts into the largest possible number of lots to sell as quickly as possible at the highest possible price. Indeed, one of the objects of the city plan is to regulate and restrain a practice so detrimental to homogeneous city growth.

It is only within the past few decades—indeed, outside of Germany, it might almost be said that it is only within the present century—that there has been any approach to a well-defined art, much less a science of city planning. This is explained by the relatively slow growth, small size, and simple needs of cities up to about the middle of the nineteenth century.

In olden times cities grew subject to little rule, save natural topography and the possible fancy or rather good judgment of some powerful ruler. When there was conscious planning, there was little to be provided for except streets of light traffic, largely pedestrian, a few open spaces and public buildings for civil and religious assembly, and, quite often, walls and other military defenses.

The marvelous growth of cities in the nineteenth century was so sudden and, through the advance of the arts and sciences, the needs of city dwellers became, simultaneously with this growth, so many and complex, that there was little time and less experience to direct its development. Street space became overtaxed at the surface and above and below it, by the advent of street railways, water, gas, and sewer pipes, and telegraph, telephone, and electric light and power wires. The tall office building with the consequent crowding of people during work hours introduced new problems of transportation. All these things, combined with a score of modern city conditions, made it necessary to plan or replan streets on a different scale, corresponding to the volume and character of the traffic they bear. Congestion of population made it imperative that parks, playgrounds, and breathing spaces, adequate and accessible, become an essential part and not a decorative afterthought of the city plan. With all this many legal and financial problems arose, not all of which are yet solved. In fact, while many of the elements of city planning, like the laying out and improvement of streets, water supply and sewerage, the utilitarian and æsthetic phases of park development, and the provision of rapid means of communication, have been put on a scientific basis, many others have not, and much remains to be done to correlate the elements of city planning with each other and bring all into a harmonious whole.

Since city planning as now conceived is so largely in the formative stage, and most of its elements are treated separately in other articles, the remainder of the present article will be devoted to an outline of city planning. For the better understanding of the subject the main types of city street plans will be described, since until quite recently city planning was confined chiefly to the laying out or remodeling of street systems and open spaces. The three main types of street plans are (1) the rectan-

gular, gridiron, or checkerboard; (2) the radial or diagonal, which sometimes may more properly be called the radial and circular or polygonal; and (3) a combination of the first two. To these there may be added the designedly irregular plan.

Obviously the simplest street plan is the rectangular, since it is easily laid out and mapped or otherwise recorded and lends itself readily to the transfer of property, besides making for directness of travel, as compared with winding streets. Radial street plans facilitate the movement of street traffic to and from central points, but give many awkward-shaped lots and make it necessary to turn many corners to get to points not on the radial streets. The radial or diagonal plan, superimposed on the rectangular plan, has some advantages over either, but is still liable to leave many awkward-shaped parcels of land. The designedly irregular type of street plan, largely a modern innovation and not widely used as yet, but admirably adapted to the local conditions of some cities, has the streets laid out quite irregularly, on curves following contour lines. The curved streets so formed avoid or reduce grades and often afford a pleasing variety of street views. Diagonal streets, or streets on curves whose general direction is diagonal, may prevent overirregularity. Streets on contour lines are particularly suited for residence districts. The streets of most cities of both ancient and modern times follow the rectangular plan, if any plan at all, except where some topographical feature, such as steep hills or curved water fronts, made this impossible.

Historical Outline. According to Unwin, the earliest-known town laid out on a definite plan was built about 3000 B.C. and was the semi-permanent construction camp (called Kahun) for the pyramid of Illahun. (Consult Flinders Petrie's *Illahun*.) This town had a rectangular street plan, with drains or gutters in the centre of the street, instead of at the side as in ancient Pompeii.

The earliest-known city planner of note appears to have been Hippodamus, an architect of Miletus, a follower of Pythagoras, and probably a contemporary of Pericles. Hippodamus is credited with the plans of the Piræus (the fortified seaport of Athens), Thurii, and Rhodes (the last in 408 B.C.), and has been called "the Greek Haussmann of the fifth century B.C." The Piræus was a fortified city which had a system of broad, straight streets, crossing each other at right angles, broken at frequent intervals by open squares, and adorned with temples and monuments, and provided with an agora similar to the later Roman Forum. In its best days the Piræus was connected with Athens by the "Long Walls," which made the two cities virtually one and impregnable so long as Athens was mistress of the seas. (Gardner, *Ancient Athens*, New York, 1903.) A modern reproduction of the Piræus and the strip inclosed by the Long Walls is the territory annexed in 1909 to Los Angeles to give that California city a seaport. Another notable ancient Greek city, laid out on the rectangular plan, was Selinus, in southern Sicily, founded by the Dorians about 628 B.C. and said to have been systematically laid out by the architect Hermocrates. Its acropolis appears to date from 575 to 560 B.C. and has been the subject of recent survey, study, and conjectural restoration by Gustave Fongères and Jean Hulot. (Consult a paper by Fongères, translated by J. W. Simpson for the 1908 exhibit of the Royal Institute of British Architects, *R. I. B. A. Journal*, 3d series, vol. xv. No. 4.)

The Romans, like the Greeks, laid out cities on the rectangular plan, also taking advantage of natural features; but whereas the Greeks were ever ready to modify or abandon the regularity of their plans, in order to use hillsides or rocky eminences to give grandeur and emphasis to their public buildings, the Romans often went to great labor and expense to level the sites of their cities. (Consult Anderson and Spiers, *The Architecture of Greece and Rome*.) The plan of the typical Roman city followed the lines of the Roman military camp, with two main thoroughfares at right angles to each other, and with a forum at or near the centre. An English example of this type is the old walled town of Chester. An interesting American copy of a Roman camp is the Dutch stockaded settlement of Bergen, N. J., laid out in 1660 and now the Bergen square section of Jersey City. (Consult *Engineering News*, Feb. 8, 1912, for history and for comparative plans of Roman camp and property around Bergen Square; Vitruvius, *De Architectura*, bk. ii, chap. iv, for Roman and Greek ideas of laying out a city.)

Although it is commonly believed that the mediæval towns of Europe were almost invariably irregular in plan, Triggs states that such cities as were really planned de novo in the Middle Ages were more regular than most modern towns. In the thirteenth century 50 towns were laid out in as many years by the English in Aquitaine and Guienne. Where practicable, these were laid out on a definite rectangular system, with wide, medium, and narrow streets and a large central market place with a church at one of its corners. "The most perfect example of these English towns of Edward I," says Triggs, "is Montpazier, founded in 1284 in Aquitaine; while the best example of the sort in England is Winchester, which was founded by Edward I on a new site."

The Renaissance led Italian towns in the sixteenth century to straighten and widen their streets and lay out public places. Rome was rebuilt at this time. The movement extended to France. Bernard Palissy wrote a treatise on town planning in which he urged that the streets be laid out squarely and regularly. In Germany, also under the influence of the Renaissance, the irregular city development of the Gothic period began to give way to more regular street plans. Notable examples are Mannheim and Karlsruhe. In the former the streets are mostly rectangular with a few diagonal and one which forms a part of a ring; in the latter, founded in 1715, the streets radiate from the castle of the founder. In Scotland the newer portion of Edinburgh, dating about 1768, affords a fine example of systematic and impressive city planning.

Among the lost opportunities of replanning a poorly planned or no-planned city, London takes the lead chronologically. After the fire of 1666 the great architect, Sir Christopher Wren, laid out a new city plan for London which has aroused the admiration of city planners ever since. A combined radial and rectangular street plan, with St. Paul's Cathedral as the main focal point, was proposed. The plan was sanctioned by Parliament, but the opposition of merchants and others anxious to rebuild immediately and opposed to the delays and troubles of reparceling the land, prevented the execution

of this plan. Somewhat like this was the experience of San Francisco after the earthquake and fire of 1906. The eminent architect and leader of American city planners, D. H. Burnham, had reported on a city plan just before the catastrophe occurred, but in rebuilding the city his plan was almost wholly ignored. In like manner Baltimore after its great fire of 1904 made but slight use of the opportunity this afforded to rebuild the city on a better plan. Considerably earlier the same lack of foresight was shown by Boston after the fire of 1872.

Philadelphia, founded in 1682 by William Penn, was laid out on the rectangular plan, with a large open space at the intersection of the two broad central streets and four smaller squares in each of the quarters of the city. From that day to this the rectangular plan has been followed so generally in the United States, where any considerable area has been laid out in advance of building operations, that it has become known abroad as the American or checkerboard plan. In a city of any size the result of this plan is an unspeakably dreary monotony. A notable American example of city planning, but one which unfortunately had no great influence upon subsequent city building for over a century, is the city of Washington. The national capital was planned in 1791 by Pierre Charles L'Enfant (q.v.), under the direction of George Washington and after a study of the plans of many European cities. The base plan of Washington is rectangular, but superimposed upon it is a network of diagonal streets, with numerous parks, open spaces, and commanding sites for Federal buildings. The main focal point is of course the Capitol. In grandeur of conception and in fitness of both general plan and detail, the layout of Washington was worthy of the capital of a future great nation. With such an example before it, it might have been expected that the commission which laid out the northward extension of New York City in 1807 would have avoided the rigid checkerboard plan, unrelieved by any break except that afforded by the already located Broadway. It is said that Thomas Jefferson, who also had a hand in the planning of Washington, favored a purely rectangular street system, and it is suggested that Washington was largely responsible for the radial streets, since he was familiar with the city of Annapolis, Md., laid out on a limited scale after Wren's plan for rebuilding London, and also that, when Washington was a young surveyor, he laid out a small town near Connellsville, Pa., with radiating streets. To L'Enfant is credited the plan of the radial avenues of Buffalo.

A bold reconstruction of the plan of Paris, under the direction of Georges Eugène Haussmann, Prefect of the Seine, and after the design of M. Dechamps, architect, was carried out in 1852–70. It made use of diagonal streets and a great central parked and monumented way to open up ample means of communication through a crowded and haphazard network of streets; at the same time supplying noble vistas, closed with notable public buildings and historic monuments. A large part of the success of this great scheme, and of its continuance from its inception to the present time, is due to the creation and perpetuation of a city-planning or art commission.

Berlin, since 1862, has also followed a systematic street-plan scheme. Some of the larger Italian cities have had similar commissions for a number of decades.

THE RECENT CITY-PLANNING MOVEMENT

Germany. The examples of city planning which have been mentioned thus far were isolated and sporadic and followed no well-defined and generally accepted principles. It is to the scientific and artistic spirit of the Germans, stimulated by the national and municipal growth of the last few decades of the nineteenth century, that we are indebted for the beginnings of the modern art of city planning. As early as 1876 Prof. R. Baumeister of Karlsruhe wrote a book on the planning of suburbs (*Stadteerweiterungen*), and this was followed by many other books by the same author on various phases of city planning. A great impetus was given to the movement by *Der Stadtebau*, a small book first published in 1889 from the pen of Camillo Sitte, of Vienna, emphasizing the æsthetic side of city planning. About the same time appeared the larger and more comprehensive *Der Stadtebau* by J. Steuben, city architect of Cologne. In 1904 there was established, by Theodor Gaecke and Camillo Sitte, an important German monthly, *Der Stadtebau*. According to Unwin, the Germans followed the geometrical system until 1889. Since then, influenced in part by Sitte, they have been in danger of going too far with the irregular and picturesque. Unwin mentions Cologne as an example of the transition planning and Nuremberg, a town plan for which was completed in 1907, as one of the most beautiful of German cities. It is important to note that Sitte's studies of mediæval towns led him to conclude that their irregularity was a matter of well-considered design rather than of chance.

England. In England city planning (or town planning, as it is called) was given the serious attention of the Seventh International Congress of Architects, London, 1906. In 1909 Parliament passed the Housing and Town Planning Act, which gives local authorities broad city-planning powers, subject to control by the Local Government Board. Many local authorities have proceeded under this act, chiefly in laying out vacant or scantily populated areas. The garden city movement, or small-town and suburban development for wage earners and other people of small means, has also made marked progress in England in the last few years. Notable examples are at Bourneville, Port Sunlight, and Hampstead Garden Suburb. The *Town Planning Review* (Department of Civic Design, School of Architecture, University of Liverpool) was started in 1910 and is a valuable quarterly exponent of British and foreign ideas and practice.

United States. The inspiration for the recent city-planning movement in the United States came largely from the World's Columbian Exposition of 1893. The well-ordered disposition of buildings, land and water spaces, monuments and other features of accentuation and adornment of the "White City," made an impression upon the minds of visitors which rapidly bore fruit. Its conception, as a whole, and some of its greater parts, were due to the late Daniel H. Burnham. The awakening caused by the World's Columbian Exposition, and subsequent European visits of American architects and students of municipal problems, led to the

presentation of many papers on various phases of city planning before such societies as the American Institute of Architects. In 1900 that body listened to a number of papers on *Future Grouping of Government Buildings and Park Treatment of Washington.* The interest thus awakened led to the appointment of a Federal commission on the plan of Washington, which pointed out how largely the L'Enfant plan had been ignored for many decades and recommended that the main outlines of the plan be followed in the future. Congress subsequently authorized a number of public buildings and other improvements in accordance with the revived and revised plan. The commission was headed by D. H. Burnham, and included F. L. Olmsted, Jr., and Charles F. McKim, with whom there was soon associated Augustus Saint-Gaudens.

All this discussion and its fruition at Washington added materially to the interest in city planning the country over. Various civic organizations and more rarely cities themselves have engaged landscape architects or engineers to prepare reports. Up to the close of 1913 such reports had been made for perhaps 100 cities and towns of the United States. These reports ranged from plans affecting the general layout of the whole city to suggestions for grouping public buildings at civic centers. At the close of 1913 but little had been done to carry out the recommendations made in the several reports. Perhaps the greatest progress was on the Cleveland civic-center group and mall, a plan for which was proposed by a commission some years before, of which D. H. Burnham was chairman. The most elaborate plans, both as to scope and method of presentation, were those worked out for Chicago in 1906 to 1908 by D. H. Burnham and Edward H. Bennett, under the direction of the Commercial Club of that city and published in 1909. Some progress in accordance with these plans had been made in 1913.

In 1907 the City Plan Commission of Hartford, Conn., was created. Somewhat similar official bodies were subsequently created in Milwaukee, Chicago, Detroit, Jersey City, Newark, St. Louis, Cleveland, Pittsburgh, Philadelphia, Cincinnati, and in smaller cities. In May, 1913, there were reported 18 city-plan commissions, with many more to follow under mandatory legislation in Massachusetts and permissive legislation in Pennsylvania and New York. A Massachusetts Act of 1913 directs all cities and all towns of 10,000 population and upward (of which there are many) to create city-planning boards. In the same year New York cities and villages and Pennsylvania cities of the third class were authorized to appoint planning commissions.

Canada. In 1913 city-planning commissions existed in Calgary, Winnipeg, Regina, Edmonton, Saskatoon, and Lethbridge, and the Province of Alberta passed a Town Planning Act in 1913. The same year Calgary and Victoria called a British expert to their aid, and St. John, N. B., was engaged in wholesale modernization work.

Prince Rupert, British Columbia, described by the *Review of Reviews* (April, 1910) as a city made to order by a railway, was laid out by the Grand Trunk Pacific Railway as its western terminus. The town covers 2000 acres of hilly land at the head of a bay some 14 miles long. The site was chosen because of its excellence for a deep-water harbor on the Pacific coast. In "The Real Prince Rupert" (*Architectural Record*, July, 1913) the population was given as 4000, and it was stated that large sums of money must be expended before the city can attain the standard set by other cities in the Canadian Northwest. Prince Rupert, however, has the advantage of a definite plan to follow, which can be said of but few cities.

Australia. The Australian Commonwealth received competitive plans for a new capital in 1912, to be built on an unoccupied site in Yass-Canberra, New South Wales, in a federal district 900 square miles in area. The first prize, £1750, or nearly $8500, was awarded to Walter Burley Griffin, architect and landscape architect of Chicago, Ill. Subsequently all the designs presented were referred to a departmental commission which decided to take the best features of each and combine them into a new plan. Both this procedure and the result were severely criticized. In 1913 Mr. Griffin was invited to go to Australia to assist in further deliberations over the plans for the new capital, and early in 1914 it was announced that the government had adopted his own modification of his original premiated design. Consult the *New International Year Book*, 1912; also *Engineering News*, July 4, 1912; New York *Sun*, Sept. 22, 1912; New York *Times*, Feb. 9, 1913; and *Official Reports* addressed to Minister for Home Affairs, Melbourne.

Other Countries. Besides the countries mentioned, other parts of the world are taking a part in the city-planning movement. To mention only two cities: Dalny, a seaport terminal for the trans-Siberian railway, has been built on a combined rectangular and radial plan. Delhi is being replanned as the new capital of India.

Bibliography. Consult the *New International Year Book*, 1912 and 1913, for further details of the modern city-planning movement and articles on leading American and foreign cities in this ENCYCLOPÆDIA, as well as the various travelers' guidebooks, atlases, etc., and the books cited below for plan of cities. For some 600 titles, consult *Select List of Works Relating to City Planning and Allied Subjects*, prepared by the New York Public Library for the City Planning Exhibit held in New York City in 1913. This list includes earlier bibliographies, periodicals, general works, American and foreign, city and town planning reports, garden cities, parks, water supply, sanitation, etc. AMERICAN books are: Robinson, *The Improvement of Towns and Cities* (New York, 1901); Robinson, *Modern Civic Art* (New York, 1903, illus. ed., 1904); Nolen, *Replanning Small Cities* (New York, 1912); Wacker's *Manual of the Plan of Chicago, especially designed for Study in the Schools of Chicago* (Chicago, 1912). Particularly valuable from an economic viewpoint and for its many typical city-street plans is Hurd's *Principles of City Land Values* (New York, 1905); from another viewpoint see chapters 2, 8, and 9 of Weber, *The Growth of Cities in the Nineteenth Century* (New York, 1899). BRITISH: Triggs, *Town Planning, Past, Present and Possible* (London, 1909); Unwin, *Town Planning in Theory and Practice* (London, 1911); Mawson, *Civic Art* (London, 1912); Bentley and Taylor, *Housing, Town Planning, etc., Act, 1909* (text and exposition of the British Town Planning Act, London, 1911). GERMAN: Baumeister, *Stadterweiterungen* (Berlin, 1876); Sitte, *Der Städtebau nach seinen kunsterlischen*

Wundsatzen (Vienna, 1889); Steuben, *Der Städtebau* (Darmstadt, 1890).

Periodicals. *Der Städtebau* (Berlin, 1904); *Garden Cities* and *Town Planning* (London, 1906); *Landscape Architecture* (official organ of the American Society of Landscape Architects, Harrisburg, Pa., 1910 to date); *Town Planning Review* (Liverpool, 1911, to date). Many valuable papers are included in *Proceedings National Conference on City Planning* (Washington, 1909, and Boston, 1910, to date); also in *Proceedings and Journal American Institute of Architects* (Washington, D. C.); *Transactions Royal Institute British Architects* (London, particularly for 1911). Consult also leading architectural journals.

CITY POINT. A village in Prince George Co., Va., 10 miles northeast of Petersburg, on the James River and on the Norfolk and Western Railroad (Map: Virginia, G 4). It has a gunpowder plant and is of considerable historical interest. Here, in 1864, General Grant made his headquarters, and in his subsequent operations the city was used by the Federal army as its principal landing place and depot for supplies. One mile from the village a national cemetery is situated. Pop., 1914 (est.), 400.

CITY POLITIQUES, pŏl'ĭ-tēks'. A satirical comedy, probably printed for the first time in 1683, and produced at the King's Theatre, London, the same year. It is a sharp attack on the contemporary Whig faction, especially on Oates, in the character of Dr. Pauchy. Only the King's protection kept it from being suppressed by the victims of the satire. Some authorities place the date of publication as early as 1675.

CITY RAMBLE, THE; or, THE PLAYHOUSE WEDDING. A play by Elkanah Settle, printed in London in 1711 and produced at the Drury Lane Theatre, Aug. 17, 1711. It is partly founded on Beaumont and Fletcher's *Knight of the Burning Pestle* and *The Coxcomb*.

CITY WIT, THE; or, THE WOMAN WEARS THE BREECHES. A comedy by Richard Brome (q.v.).

CIUDAD BOLÍVAR, sē'o͞o-dăd' bō-lē'văr (Sp., city of Bolívar). The capital of the State of Bolívar, Venezuela, on the right bank of the Orinoco, about 240 miles from its mouth (Map: Venezuela, E 2). It is situated at a narrow point of the river, only 185 feet above sea level, and is well built, having spacious, handsome buildings. Of these the more notable are the palace of the governor, the college, the market, the cathedral, and the theatre. There are several fine monuments in the plazas Bolívar and Guzmán Blanco and in the cemetery. The city is the seat of a bishop. Owing to its position on the Orinoco, Ciudad Bolívar is an important commercial centre, and although certain restrictions have somewhat hurt its trade it long ranked as fourth among the large ports of Venezuela. Its chief export is coffee; but rubber, cattle, hides, sugar, and asphalt also are exported in considerable quantities. Population, 11,686. Ciudad Bolívar was founded in 1764 as San Tomás de la Nueva Guayana, but because of its location at a narrow part of the river it was known as Angostura until 1819, when the Congress met which, under the inspiration of Simón Bolívar, formed the new Republic of Colombia out of the states of Venezuela and New Granada. Since then the city has borne his name.

CIUDAD DE LAS CASAS, dā läs kä'säs. See SAN CRISTÓBAL DE LOS LLANOS.

CIUDAD DE LOS REYES, dā lōs rā'yās (Sp., city of the kings). The name given by Pizarro to the present city of Lima, Peru, when he founded it, in 1535, on the banks of the river called, by the Quichuan (Peruvian) Indians, "Rimac," which became first "Limac" and finally "Lima."

CIUDADELA, thē'o͞o-dā-dā'lä (Sp., little city, dim. of *ciudad*, city). A seaport town of the Spanish island of Minorca, situated on the west coast. Pop., 1887, 8447; 1900, 8645; 1910, 9369.

CIUDAD GUZMÁN, go͞os-män'. A city of Mexico, in the southern part of the State of Jalisco, 60 miles northeast of Colima. In 1891 it had a population of 23,025, but that number declined to 17,596 in 1900.

CIUDAD JUÁREZ, hwä'räs (Sp., city of Juarez). A city in the State of Chihuahua, Mexico, on the Rio Grande, opposite El Paso, Tex., and on the Mexican Central Railroad (Map: Mexico, F 2). It is situated at an altitude of 3800 feet above sea level, in a fertile district, devoted to agriculture, stock raising, and fruit and vine cultivation. The city has a Mexican army post, customhouse, and a statue of Juárez. It is the residence of a United States Consul. Ciudad Juárez was formerly known as El Paso del Norte. Pop., about 7000.

CIUDAD PORFÍRIO DIAZ, pôr-fē'rē-ō dē'äs. A town in the State of Coahuila, Mexico, on the Rio Grande, opposite Eagle Pass, Tex., and on the Mexican International Railroad (Map: Mexico, H 3). It is the Mexican terminus of the international bridge across the Rio Grande, and has a Mexican army post and a customhouse. It is the residence of a United States Consul. The town is the centre of an agricultural, stock-raising, and fruit-growing region, and carries on an extensive international trade. Coal is found in the vicinity. Ciudad Porfírio Diaz was founded in 1849, and derives its present name from the former President of the Republic. The town was formerly called Piedras Negras. Pop., about 5000 (est. of 1900).

CIUDAD REAL, thē'o͞o-dăd' rā-äl' (Sp., royal city). A town of Spain, capital of the province of the same name, in New Castile, situated in a fertile plain between the rivers Guadiana and Jabalón, about 100 miles south of Madrid (Map: Spain, D 3). It is surrounded by walls, is the seat of a bishopric, and has some notable edifices, including the municipal building, the parish church of Santa María del Prado—a massive Gothic structure, with a fine interior—and several monasteries and hospitals. There are manufactures of coarse woolens, linen, olive oil, flour, leather, etc.; also a trade in the agricultural produce of the district, which is engaged in raising stock, particularly mules, and bulls for the ring. An annual fair is held. Pop., 1900, 15,327; 1910, 16,372.

Ciudad Real was founded by Alphonso X, after the middle of the thirteenth century, as a fortress against the Moors, and soon attained considerable importance from the privileges granted by its founder. In 1809 the town was the scene of a Spanish defeat by the French, under Sebastiani.

CIUDAD RODRIGO, rō-drē'gō (Sp., city of Rodrigo). A fortified town of Spain, in the Province of Salamanca, near the Portuguese frontier (Map: Spain, B 2). It is situated on

an elevation above the river Agueda, which is here crossed by a fine bridge, and has a cathedral of considerable architectural interest, the earliest portion of which dates from the close of the twelfth century, three Roman columns, and remains of an aqueduct. The city was founded in the twelfth century by Count Rodrigo González, whence its name. The manufactures include soap, leather, linen, woolens, etc. The town is the seat of a bishop. Pop., in 1900, 8007.

In the War of the Spanish Succession, Ciudad Rodrigo was taken by the English in 1706, and recaptured by the French in the following year. During the Peninsular War it was captured by the French under Marshal Ney in July, 1810; but in January, 1812, it was retaken by the British, under Wellington, who thereby won his titles of Earl of Wellington in the peerage of Great Britain, Duque de Ciudad Rodrigo and Grande de España (First Class) in the peerage of Spain, and Marquéz de Torres Vedras in the peerage of Portugal.

CIUDAD VICTORIA, thē'o͞o-däd' vĭk-tō'rē-ä (Sp., city of victory). The capital of the State of Tamaulipas, Mexico, 160 miles southeast of Monterey (Map: Mexico, J 6). It is finely situated on the east slope of the great plateau and is the centre of a sugar-growing district. It is the see of a bishop and the residence of a United States consular agent. Ciudad Victoria dates from 1750, under the name of Santa María del Refugio de Aguayo, and not until 1825 was its present name adopted. Pop., 1900, 10,086.

CIV'ET (Fr. *civette*, from MGk. *ζαπέτιον, zapetion*, from Ar. *zabad, zubad*, civet, from Pers. *zadab*, froth of water). A genus (*Viverra*) of carnivores of the Old World family Viverridæ, connecting the cats with the hyenas, and having the body elongated in some of the species as much as in the weasel tribe; the head is also long and the muzzle sharp. The ears are short, broad, and rounded. The feet have five toes, and the claws are only semi-retractile. There is a more or less conspicuous erectile mane along the back, as in hyenas. Near the sexual organs, in both sexes, there is a large double pouch, in which is secreted an odoriferous, fatty substance, called "civet," much used in compounding perfumes. There are several species of civet, of which the best known is the common or African civet (*Viverra civetta*) of northern Africa, from 2 to 3 feet long, brownish gray, with numerous black bands and spots. The civet preys on birds, small quadrupeds, and reptiles, and is regarded as a benefactor along the Nile on account of its appetite for crocodile's eggs. It is very commonly kept in confinement for the sake of its perfume, which is removed from the bag about twice a week by means of a small spatula and is obtained most abundantly from the male, especially after he has been irritated. A dram is a large quantity to obtain at a time. After being cleaned of hairs, washed, and dried, civet is ready for the market, and is worth from $10 to $12 an ounce, if pure. About 20,000 ounces are imported into London annually, and this represents a large part of the total product. The civets kept for the purpose of providing perfume are fed on raw flesh; the young partly on farinaceous food. The principal source of supply of commercial civet is northern Africa, especially Abyssinia. Several other species of civet occur in southeastern Asia and in the East Indies, all handsomely striped or spotted. The linsang and the binturong are most prominent among these. The American civet cat is the cacomistle (q.v.). Compare ICHNEUMON; MUNGOOS.

Fossil remains of the genus *Viverra* have been found in those deposits of the Tertiary era that lie above the Middle Eocene. They show no considerable variation from their modern descendants. The remains of other extinct allied genera from the Tertiary show interesting relations between the early members of the family Viverridæ and the hyenas. See VIVERRIDÆ.

CIVETTA. See CHEVECHE.

CIVIALE, sē'vē-äl' JEAN (1792–1867). A French surgeon, born at Thiézac, Cantal. He is remembered for his discovery (1826) of the operation of "lithotrity" for the removal of stone from the bladder without the loss of blood. For this he was awarded a prize of 6000 francs by the Academy. Sir Henry Thompson (q.v.) was one of his pupils and followers. Civiale's important writings are all on operation for stone and on diseases of the genito-urinary organs.

CIVIC ASSOCIATION, AMERICAN. An organization founded in 1904, for the "cultivation of higher ideals of civic life and beauty in America, the promotion of city, town, and neighborhood improvement, the preservation and development of landscape, and the advancement of outdoor art." The association carries on its work on national lines by its varied activities for the physical improvement and development of the communities. It has directed special attention to the importance and comprehension of city planning, and such other activities as the creation, development, and maintenance of parks and boulevards, the wise planting of trees, the elimination of the smoke, billboard, and housefly nuisances, and the organization of adults and children into working groups for civic improvement. During 1913 a group of members of the association visited European countries for the purpose of studying civic advance and the methods adopted in these countries for efficient administration. One of the most important movements undertaken by the society was the protection of the scenic beauty of Niagara Falls. The association has also led in the movement for the protection of national parks. The president in 1914 was J. Horace McFarland. Its headquarters are in Washington, D. C.

CIV'IC CROWN (Lat. *corona civica*). One of the most highly valued honors that a Roman could obtain. It was given for saving the life of a citizen in battle, provided that in so doing the rescuer slew the opponent and maintained the ground on which the fight had taken place. It was voted by the Senate to the Emperor Augustus as *servator civium*. It was merely a wreath of oak leaves, with pendant acorns. The one to whom it was given had the right to wear it always. When he appeared at the games, all rose to do him honor, and he was entitled to a seat next to the senators; he was also excused from all troublesome duties and services, with the same immunities for his father and his father's father.

CIVIDALE DEL FRIULI, chē'vē-dä'lā dĕl frē-o͞o'lē (probably from ML. **civitalis*, from *civitas*, town). A city in the northeastern part of Italy, in the Province of Udine, near the Austrian border, about 10 miles east by north of the city of that name, with which it is connected by rail (Map: Italy, H 1). The Natisone, which flows through the city, is crossed

by a fifteenth-century bridge. There are many relics of the eighth and tenth centuries, and the cathedral, which is of the fifteenth century, contains many valuable MSS. and art treasures. Cividale was for many years the residence of Lombard dukes. The modernized city has a military training college, and silk, cotton, and linen factories. Pop., 1901, 9061; 1911, 10,031.

CIVIL ACTION (Lat. *civilis*, from *civis*, citizen). Any judicial proceeding involving a controversy between individuals in regard to their private matters, distinguished from proceedings where public interests are concerned, as in a criminal prosecution. Civil actions include the procedure in a court of chancery or equity, and also those cases in which the state submits to an action instituted by an individual. See ACTION; PROSECUTION.

CIVIL ADMINISTRATION. In the most general sense, public administration—the conduct of the affairs of the state, or government, or of any subordinate division thereof. In a more restricted sense, the term is frequently employed to describe the management of the municipal or nonmilitary concerns of the state; and sometimes, more narrowly, as referring to the executive and judicial departments of the government, as distinguished from the legislative. See ADMINISTRATION; ADMINISTRATIVE LAW.

The principles and the methods of civil administration vary greatly, from the simplicity and flexibility of patriarchal government or other personal autocracy, to the rigidity of a modern bureaucratic system, like that of France and Russia, and the complexity of a highly developed political system, like that of Great Britain and the United States. There is a general similarity among modern civilized states in the organization and working of the central administration. The great departments of state—those having to do with foreign affairs, with the army and navy, with the collection and disbursement of national revenue, with commerce and industry, and with the post office—present no great diversity, either in functions or in organization. The chiefs of these departments are ministers of state, the principal and authorized advisers of the executive, or, as in Great Britain, constitute the real executive. (See CABINET.) Usually these chiefs are political and therefore temporary officers, who may come and go without greatly modifying the organization and methods of their departments. Their influence is great while it lasts, but is short-lived; the permanent policy of the administration, as well as its methods and *personnel*, being for the most part determined by permanent officials of great experience, known as undersecretaries, assistant secretaries, bureau chiefs, etc. As these permanent officials are the persons who really conduct the work of administration, so they are, in everything but the political sense of the term, responsible for the proper conduct of the affairs of their respective departments, and, being so, they are usually unfettered in the choice of their subordinates.

In other matters, however, especially in those of purely domestic concern—as the administration of justice; the maintenance of the public peace; the supervision and control of religion, of morals, and of public education; the levying and collection of taxes, direct and indirect; the conduct of elections, and the "internal affairs" generally of the community—there is as great diversity in the organization and methods of administration as there is in the political character and ideals of the several states. In those countries in which the feudal and monarchical tradition is strongest, whatever the form of the government may be, not only is the civil administration most highly centralized, but it is much further-reaching, more searching and obtrusive, than in those countries which have more completely emancipated themselves from that tradition. This is as true of republican France as of monarchical Germany and autocratic Russia. In the free governments, on the other hand —as in the United States, Great Britain and her self-governing colonies—not only is the administration decentralized, and left, as largely as possible, in the hands of local self-governing groups, but the general administration is rigidly confined to matters of general or national concern, and is not permitted to trench upon the local concerns of the subordinate political groups of the state. In these countries, accordingly, such matters as the building and repair of roads and bridges, and the maintenance of an adequate constabulary or police force, are dealt with by the borough, parish, town, or city, and not by the state; while, in the United States, even the matter of public education, which is conceded to be an affair of state, and is usually governed by State statutes, is, for the most part, turned over to the locality concerned—the city or school district— for administration.

While in no modern civilized state is the administration wholly centralized, or, on the other hand, wholly decentralized, the two systems are, in their principles and methods, if not in their actual embodiment in practice, so sharply discriminated as to call for a few words of comparison. Doubtless a centralized administration is capable of a much higher degree of efficiency than is attainable under the other system. For matters of great moment, requiring time for their maturing, and, when ripe, calling for prompt and decisive action, it is indispensable. No government would think of employing any other system in its military and international affairs. Then, too, it achieves a certain uniformity and regularity of action, and thus tends to strengthen the established government by giving its administration an impersonal effect of permanence and solidity. On the other hand, these very qualities of regularity and uniformity of action tend to harden into the inflexibility and routine of bureaucratic system, which, being lifted above public opinion and free from any effective criticism, crystallizes its abuses in the form of hallowed customs, and lends itself too easily to oppression.

The virtues of the system of decentralization are political rather than administrative. It is only under this system that a free government has free play for its varied activities and experiments. And, though its potential efficiency is not to be compared with that of the system of centralization, it has much to recommend it even from the purely administrative point of view. While not adapted to the regulation of international relations, or the carrying out of far-reaching measures of policy, its responsiveness to public opinion makes it an efficient agency for supervising and controlling the far more numerous and important private and local interests of the community. Being local and familiar, it is vigilant and sympathetic; and

though some of the affairs committed to it may be badly administered, it is probable that the sum total of its achievement is greater than that of a centralized administration, with its limited knowledge and its indifference to criticism.

The character of the public administration—whether efficient or inefficient, economical or wasteful, pure or corrupt—depends fundamentally on the conception of the proper aim and purpose of government which prevails. Extravagance and corruption, and, with them, the inefficiency they engender, flourish under any government, whether popular or autocratic in form, which is maintained for the benefit of the ruler, whether that be a king, an aristocracy, or a political party. And, on the other hand, the honest acceptance of the principle that government is instituted for the benefit of the governed tends to produce clean and efficient administration, whatever the external form of the state. It is doubtless to the persistence of the feudal conception of the state that we owe the long era of corrupt and, upon the whole, inefficient administration of public affairs which has marked the history of modern states. So long as the executive head of the state is at once the supreme landowner and the lord paramount, from whom all honor and protection are derived, so long will the offices of administration be regarded as his perquisites, and the treasure derived from taxation of the people be expended for the gratification of his ambitions and those of his favorites. He may, of his favor, or for his own purposes, grant a certain measure of efficient administration; but the extravagance and corruption which are inseparable from that system will destroy the efficiency of the government as well.

The profound modification of the theory of government effected by the democratic movement of the eighteenth and nineteenth centuries, in substituting the welfare of the people at large for that of the governing classes as the end and aim of government, has brought about a corresponding revolution in its administration. This change became apparent in England upon the accession of William of Orange to the throne in 1689, and in France a hundred years later, in the Revolution; but owing to the development of party government in the former country, and the excesses to which that system led, it did not become effective there until the middle of the last century. It is true that more than one administrative reform had been accomplished in Great Britain—as in the provision of Magna Charta, requiring all justices, constables, sheriffs, and bailiffs to have knowledge of the laws of the realm; the statute of Edward VI (1552) forbidding the sale of offices (except the higher judicial offices); and the extraordinary law enacted in the twelfth year of Richard II (1388), declaring that "none shall obtain office by suit, or for reward, but upon desert"; yet as late as the period of the American Revolution the "spoils system" of the distribution of public office as the reward of party service flourished unchecked. In the United States that vicious system did not come into existence until the administration of President Jackson, and it is only now giving place to the system prefigured in the statute of Richard II, above referred to. (See CIVIL-SERVICE REFORM; MERIT SYSTEM.) The more recent development of party government in France has lately fastened the spoils system on the administration of that country; but, upon the whole, in Europe as well as in America, civil administration has been enormously improved, in purity and economy as well as in efficiency, during the last hundred years; while in England and many of the English colonies, and in considerable portions of the administrative system of the United States, it has completely emancipated itself from the taint of corruption and extravagance. (See GOVERNMENT.) For a comparison of administrative systems and methods of controlling officers of administration, see Goodnow, *Comparative Administrative Law* (2 vols., New York, 1893). Consult also Goodnow, *Administrative Law of the United States* (New York, 1905), and Bryce, *The American Commonwealth* (London and New York, 1888, 1913).

CIVIL CHURCH LAW, AMERICAN. The body of law which defines the ecclesiastical function of the State, and maintains the civil status of the religious bodies within the United States. The status of the American churches is without a parallel in Christendom, in that in no other state do all organizations for the purposes of religion bear exactly the same legal relation to the civil authority. This body of law has been developing during the life of the American people as a nation, and has become one of the fundamental principles of their political philosophy. It is to be found (1) in provisions of the Federal and State constitutions; (2) in statute legislation; (3) in the decisions of the State and Federal courts, which now include about 1000 leading cases in these matters.

The Ecclesiastical Function of the American State. Although there is within the United States no church or churches by law established, yet the American State has an ecclesiastical function to perform. Formulated in its briefest terms, this ecclesiastical function is to cause it to be legally possible and also convenient for all residents, whether citizens, subjects, or aliens within the jurisdiction of the American governments, to sustain voluntary ecclesiastical relations. In other states it is regarded as a proper function of the civil power to provide for definite ecclesiastical relations; and the aggregate of those relations so specifically provided for is regarded as constituting an ecclesiastical establishment. In either case the civil power has an ecclesiastical function; but the difference in the two concepts is this, that the development of the individual's sphere of speech and action has in the American State completely included the sphere of speech and action for all purposes of religion, and has correspondingly altered the nature of the ecclesiastical function of the State, which, however, is none the less real because of such alteration. Such a function of the government is no mere philosophical abstraction, but is a working institution, which has been in successful operation for more than a century. It has been carried wherever there has been an expansion of American sovereignty, and has been made to meet new conditions among new peoples, and has been so applied as to maintain its principles intact, and has everywhere produced substantially the same civil status for the churches.

History of Civil Church Law. Like other successful systems, the separation of church and state, and the equal status of churches, were not planned in detail and put into operation, but developed gradually under the force of pub-

lic opinion. At the outbreak of the American Revolution the Colonies were divided ecclesiastically into three groups. In one group, consisting of New York, New Jersey, Delaware, Maryland, Virginia, North Carolina, South Carolina, and Georgia, the direct establishment of the communion of the Church of England was more or less complete in law. In the second group of Colonies, consisting of Massachusetts, New Hampshire, and Connecticut, the Congregational form of ecclesiastical organization, on the basis of the town and "poll" parish, was established in law and in fact. In the third group of Colonies, consisting of Rhode Island and Pennsylvania, no ecclesiastical establishments had been developed, either in law or in fact. As a result of political revolution, the direct establishments by royal authority were nullified in law. The indirect establishments in the New England commonwealths, built upon provincial legislation and local administration, remained undisturbed for some years. There remained, as survivals of the direct establishments, a number of incorporated parishes in New York and Virginia, and a few in other States; and, as remains of a still earlier establishment in New York, there were three or four incorporated Reformed Dutch churches that had received special protection by the Treaty of Breda, transferring the Province of New Netherlands to the British in 1667. During the Colonial period religious dissent had, with more or less vigor, resisted the legal church establishments, and especially the system of compulsory taxation for the support of the clergy; and the overthrow of British sovereignty brought its opportunity. A demand developed very generally, even in the New England commonwealths, but with stronger political backing in other sections, for a complete divorcement of political and church affairs. There is evidence that the conditions were such that the politicians could not disregard this demand. At the formation of the Federal government religious liberty was secured to the people of the United States, so far as the action of the Congress was concerned, by the provisions of Chapter III, Article 4, of the Constitution, and the First Amendment. Both of these provisions were limitations upon the powers of Congress only; and neither the original Constitution nor any of the early amendments undertook to protect the religious liberties of the people against the action of their respective State governments. Religious affairs were included within the sphere of domestic relations, and were so left to the States to deal with. There were then inserted in the early constitutions of the several States the guarantees of religious liberty generally in the forms that we are familiar with. The development of the local peculiarities in the ecclesiastical institutions of the several States and sections of the country continued without interruption. The Colonial legislatures had granted a few charters of incorporation to local churches, and this practice was continued for some years by the State legislatures. It was, however, abandoned in time, because of the objection made by the political minorities, that the granting of such particular charters was special legislation, secured by political influence. At this period the American churches were beginning to revive from the exhaustion caused by the war, and were becoming the legal and equitable owners of property. Legal means for securing property to pious and charitable uses were sorely needed. Hence, a demand arose in several of the Middle States for a uniform procedure by which the local organizations of all religious bodies could secure a corporate form, with full control of their property. To meet this demand there were enacted a series of general statutes, beginning with that of New York of April 6, 1784. An act of similar intent and of like provisions was passed, in 1793, by the State of New Jersey; and these two statutes became the models for similar laws in many of the Northern States. The provisions of these statutes were very meagre. No reference was made to particular ecclesiastical polities, except in the case of the Protestant Episcopal churches. The powers conferred upon the religious corporations so created were very limited, and nowhere were such corporations allowed to be self-perpetuating. Partiality to certain religious bodies was dreaded, and there was a very real fear that something might be done towards recreating an ecclesiastical establishment. The prevailing policy in legislation during the period extending through the third decade of the nineteenth century was based upon the idea that the civil power should treat all organizations alike, by doing as little as possible for any of them. The method of providing for the incorporation of religious societies by general statute has developed unequally in different sections of the country. As late as the year 1866, the States of Rhode Island, Virginia, and South Carolina had no such statute; and 30 years later, in 1896, a general statute of incorporation was still forbidden in the States of Virginia and West Virginia.

The third stage in the development of American civil church law has been the result of specializing legislation in two directions. One form has been the discrimination between religious organizations proper and other social, educational, and philanthropic organizations. The second form of specialization has consisted in supplementing the general provisions of the statutes with optional provisions for corporations of particular denominations and polities. Through these supplemental provisions there has been wrought into the statute law the recognition of purely ecclesiastical functionaries; and this is done most effectively by the creation of ecclesiastical corporations sole. This form of corporation is used by the Roman Catholic church, in which body in certain of the States archbishops and bishops are vested with the legal attributes of the corporation, with power to hold real and personal property and to sue and be sued. The Methodist Episcopal church also uses the ecclesiastical corporation sole. There has developed a marked legislative cordiality towards the churches. At the present time the policy is to treat all interests alike, by giving to each all that is asked. The early concept of religious organization in American law was naturally that of a simple and completely autonomous local society. To denominations whose type of polity corresponds to this concept the legislation of the general statute era was satisfactory. The special optional provisions have, therefore, been enacted as a rule for the benefit of churches having polities by which the local bodies sustain definite relations to some more general authority, such as synodical and episcopal churches. At the present time 25 distinct denominations have been thus specially legislated for. American religious corporations are not ecclesiastical corporations in

the sense of the English law, but are merely private corporations not for profit. The constituent elements of these corporations vary all the way from the total number of church members to the corporation sole; as, e.g., a presiding elder, bishop, or archbishop.

The Principles of Civil Church Law. In the course of the adjudication of the many causes that have arisen from ecclesiastical matters, the civil courts have developed the following as the basic principles of American civil church law: 1. All ecclesiastical relations are voluntary, both in their inception and continuation. 2. The freedom of action for the purposes of religion is guaranteed to every one by the organic law, and is limited by the same law by the civil rights of others, and by all that is necessary for the purpose and good order of the State and for the protection of public morals. 3. No civil right can, in the eyes of the law, be impaired by an ecclesiastical relation. 4. The law of the land is a part of the law of the churches. 5. No law of the churches, when it is found to be in conflict with the law of the land, has any validity. 6. The civil courts are open for the adjudication of ecclesiastical causes when civil rights are involved. 7. The civil courts, when they assume jurisdiction of a cause, will accept the decisions of ecclesiastical tribunals, if such tribunals act according to the church law, and do not exceed their jurisdiction. 8. The authority of the civil courts over all religious organizations is secured by the same means as in the case of private persons and secular organizations; judgments, decrees, and the issue of the writs of mandamus, information in the nature of quo warranto, prohibition, and injunction. 9. The principles of the law of charitable uses and of trusts, as modified by statute, are applied to property devoted to the purposes of religion. 10. The American clergyman, from the standpoint of the law, is a voluntary member of the association to which he belongs. The station is not forced upon him; he seeks it. He accepts it with all its consequences, and with all the rules and laws and canons then enacted or to be made by competent authority. Such laws cannot, in any event, endanger his life or liberty, impair any of his personal rights, deprive him of property acquired under the laws, or interfere with the free exercise and enjoyment of religious profession and worship; for these are protected by the constitutions and laws.

The results of American civil church law may be summed up in the language of the Supreme Court of the United States, in the case of Watson *vs.* Jones, 13 Wall. U. S., 639, as follows: "In this country, the full and free right to entertain any religious belief, to practice any religious principle, and to teach any religious doctrine, which does not violate the laws of morality and property, and which does not infringe personal rights, is conceded to all. The law knows no heresy, is committed to the support of no dogma, the establishment of no sect."

It is these principles of civil church law that are to govern in all the relations of the civil power and the churches beyond the confines of the United States—in the insular possessions of the Hawaiian Islands, Porto Rico, and the Philippines. Consult Tyler, *American Church Law;* Bayles, *Civil Church Law.*

CIVIL-DAMAGE ACTS. Statutes which have been passed in many of the United States, giving to those who sustain an actual injury by or through any intoxicated person, as a result of the intoxication, a right of action against the person who sold or gave away the liquor which caused the intoxication. In some States this liability has been extended to the owner of the premises where the liquor was dispensed; and it is immaterial whether the liquor business is lawful in the particular jurisdiction or not. While these statutes vary more or less in the different States, they generally provide for compensation for injuries to person or property of any one, and for loss of support by the wife or child of a drunkard. Exemplary or punitive damages are allowed in some cases, but actual injury must also be proved. Where one in any way helps to bring about the intoxication, he cannot recover.

These statutes have been held constitutional, being within the "police power" of the States under which the liquor traffic is regulated. See TEMPERANCE; POLICE POWER; PROHIBITION.

CIVIL DEATH (Lat. *mors civilis*). The status of a living person who is deprived by law of his legal and civil rights.

The term is of feudal origin, and was introduced into the English law after the Norman Conquest. At that time civil death was one of the consequences of conviction of treason, banishment from the realm, abjuration of the realm (by which a criminal escaped other punishment by leaving the country forever), conviction of felony, and the act of entering upon a monastic life as a monk or nun; and in all of these cases there was a total extinction of all civil rights, including loss of real and personal property, as if the person were physically dead. Treason, felony, and abjuration of the realm involved forfeiture of property to the crown as a penalty; but one taking monastic vows could make a will and appoint an executor to administer his estate.

In the United States, generally, civil death can occur only as the result of a sentence of imprisonment for life; but the doctrine is modified, so that there is only a partial extinction of the convict's rights, as in the New York statute providing that a sentence of life imprisonment shall operate as an absolute divorce of the felon from wife or husband; and in no case is his property forfeited to the State, as under the early law of England.

The English law has also been greatly modified by statutes and decisions. For an annotation on civil death in the United States, consult Davis *vs.* Laning, 18 Law. Rep. Annot., 82.

In some of the countries of Europe the ancient doctrine is still applied in cases of persons entering a monastic life. See ATTAINDER; FORFEITURE; OUTLAWRY.

CIVIL ENGINEER. See ENGINEER; ENGINEERING.

CIVILIAN. In a popular sense, a person whose pursuits are civil, i.e., neither military nor clerical. In a legal sense, the term may signify a person who is versed in the principles and rules in accordance with which civil rights may be vindicated in society generally, or in the particular state in which he belongs, or one who has made a special study of these rules and principles as exhibited in the laws and government of Rome (the Roman civil law). The civil law of Rome exercised such an influence upon the formation of the municipal systems of almost all the states of modern Europe that

those who devoted themselves to its study were regarded as "civil" or municipal lawyers par excellence. From the more learned training which this study demanded, civilian came often to be used as synonymous with professor or doctor of law, as opposed to practitioner of law, the former being generally more deeply versed in the Roman law than the latter; and this in its turn led to its being loosely applied to the great international lawyers of the seventeenth century (Grotius, Pufendorf, etc.). At present, in the United States, from having no class of persons who prosecute law as a *science* as opposed to an *art*, the term "civilian" has reverted to its narrower mediæval sense of student or teacher of the Roman civil law; and thus we speak of Savigny as a civilian, but not of Story.

CIVI'LIS, JULIUS (or CLAUDIUS). A chief of the Batavi, for 25 years connected with the army of Rome. Alienated by unjust treatment and by the execution of his brother, Julius Paulus, he headed an insurrection in Gaul in 69 A.D., but in 70 A.D. was subdued by an army under Cerealis. Having arranged with Cerealis a treaty advantageous to the Batavi, Civilis resumed friendly relations with Rome. Tacitus extols his patriotism and heroic acts.

CIV'ILIZA'TION. In general, the condition of more advanced peoples in contradistinction to those classed as barbaric and savage. See CULTURE.

CIVIL LAW. 1. The law applicable to the citizens (*cives*) of a particular state (*civitas*). The Romans used the term *jus civile* in this sense, distinguishing it from the law observed by all nations (*jus gentium*) and from the ideal law of nature (*jus naturale*). 2. The Romans also described their ordinary law, established by custom and by legislation, as their civil law, distinguishing it from the law introduced by the edicts of their magistrates very much as we distinguish common law from equity. 3. In the Middle Ages, civil law meant Roman law as set forth in the law books of Justinian, in distinction from the ecclesiastical or canon law. In England, at the same period, civil law meant Roman law as distinguished from English law. 4. Because the part of the Roman law which has most influenced European legal development is that part which deals with the ordinary relations of private persons, civil law has come, in modern European usage, to mean private law in general, without regard to its origin, as distinguished from public law. 5. In modern English usage, civil law includes and designates all the existing systems of private law that are in the main based on the Roman law. Civil law in this sense is a blend of Roman, Teutonic, ecclesiastical, and purely modern institutions and rules, fitted into a framework which is still substantially Roman. It prevails not only upon the continent of Europe and in the dependencies of the continental European states, but also in Scotland and in many parts of the world that were first colonized and civilized by the Portuguese, Spanish, Dutch, or French, and which to-day are independent (Central American and South American republics), or are under the rule of Great Britain (e.g., South Africa, some of the West Indian Islands, the Province of Quebec), or are now included in, or belong to, the United States (e.g., Louisiana, Porto Rico, and the Philippines). It is also finding its way, in some measure, into non-Christian portions of the world (e.g., Turkey and Japan).

HISTORY OF THE CIVIL LAW

I. *The Roman City Law* (*jus civile*), during the Royal period (down to about 500 B.C.), was largely religious in its character. The patricians had "*sacral*," or religious, customs which controlled the public law of the city and regulated their own family relations. The so-called Royal Laws (*Leges Regiæ*), of which some fragments have been preserved, were obviously priestly formulations of these customs. The plebeians apparently had no share in this religious law, and they certainly had special forms of marriage and of testament. The customs regulating property and debt were the same for both orders and were secular in their character. The interpretation of all law, however, whether religious or secular, rested with patrician priests; and after the expulsion of the kings the enforcement of the law was in the hands of patrician magistrates. In consequence of plebeian complaints and agitation, the nonpolitical custom of the city was reduced to writing; and the Law of the Twelve Tables, thus drafted, was submitted to and accepted by the popular assembly (c.451–450 B.C.). This code, of which numerous fragments have come down to us, set forth simple rules suitable to an agricultural community, in a remarkably clear and terse fashion. It established equal law for both orders, except in the matter of marriage; and a few years later (c.445 B.C.) even this inequality was removed. This law was prized by the Romans as a charter of liberties, and they were reluctant to amend its provisions by legislation. The necessary development of the law was therefore obtained during the following three centuries by interpretation. For two centuries the priestly order remained the authoritative interpreters; but after 252 B.C., when a plebeian became *pontifex maximus*, the legal system lost its predominantly religious character. With the expansion of Rome, its law was extended over Latium; but the Roman city law was not applicable to the Italian allies (*socii*), unless expressly made so by treaty. The best reconstruction of the Royal Laws is that of Voigt; of the Twelve Tables, that of Dirksen and Schöll. Both may conveniently be consulted in Bruns, *Fontes Iuris Romani Antiqui, Leges et Negotia* (6th ed., Mommsen and Gradenwitz, editors, Leipzig, 1893).

II. *Roman Mediterranean Law* (*jus gentium*).—The extension of Roman rule over the Mediterranean basin compelled the Romans to work out a new system of law. The Roman city law was not, in theory, applicable to the provincials, since these were not citizens, but subjects; and it would have been ill suited to the needs of Mediterranean commerce. Between the years 250 and 150 B.C. the new law required was developed: (1) in the edict of the prætor of the foreigners (*prætor peregrinorum*), who administered justice in Rome in all controversies except those in which both parties were citizens; and (2) in the edicts of the provincial governors (proconsuls and proprætors). In matters of purely local interest (e.g., family relations and inheritance) the provincial edicts apparently preserved local usages; but in matters of commercial interest the provincial edicts were patterned after the edict of the foreign

prætor in Rome. A common law of property, of contracts, and of judicial procedure was thus established for the entire Mediterranean basin. The sources of this law, according to the Romans, were the usages of all the ancient peoples (*jus gentium*) and natural reason. During the last century of the Republic the rules of the new system were gradually made applicable to controversies between Roman citizens. This was accomplished in the edict of the city prætor. In this edict, moreover, the Roman law of inheritance was modified and made more equitable. Of the city edict in its final form, much has been preserved. The best reconstruction is that of Lenel, *Das Edictum Perpetuum* (Leipzig, 1883).

III. *Roman Imperial Law.*—At the close of the Republican period Roman citizenship had been extended throughout Italy. Under the Empire it was gradually extended through the provinces, until, early in the third century, Caracalla made all the free inhabitants of the Empire Roman citizens. With this change the city law of Rome became, in theory, the law of the Empire. The prætor of the foreigners and his edict disappeared, but the city edict and the provincial edicts remained in force. These, however, had ceased to develop; the city edict received its final revision in the reign of Hadrian (117–138 A.D.). During the first three centuries of the Empire the law was developed partly by legislation, proceeding from the Emperor and the Senate, partly by juristic interpretation. Legislation gradually effaced provincial diversities; interpretation fused the city law and the prætorian law into a harmonious system. In this period the leading jurists were drawn more directly than before into the administration of justice. Three of the most famous, Papinian, Paul, and Ulpian, were successively chief justices of the Roman Empire. The juristic literature of the late Republic and early Empire (100 B.C. to 250 A.D.) was very extensive and of the highest order of excellence. It consisted largely of the collection and criticism of recorded decisions (*responsa*) and the scientific formulation of the principles on which they were based; that is, it was substantially a progressive digesting of case law. Little of this literature has been preserved, except in the *Digest* of Justinian. Of the works which have survived—which may conveniently be consulted in Huschke, *Jurisprudentiæ Antejustinianeæ quæ supersunt* (5th ed., Leipzig, 1886)—the most important are the *Institutes* of Gaius and fragments of Paul's *Sentences* and Ulpian's *Rules*. (Gaius has been translated by Poste, Oxford, 1871, 3d ed., 1890; Gaius and Ulpian by Abdy and Walker, Cambridge, Eng., 1876, 3d ed., 1885; and by Muirhead, Edinburgh, 1880, 2d ed., 1895.)

IV. *Codification.*—After the middle of the third century the law was developed solely by Imperial constitutions, viz., decisions (*rescripta*) and enactments (*leges*). The first attempts at codification were systematic arrangements of these constitutions. Such were the *Codex Gregorianus* (about 295 A.D.) and a supplementary *Codex Hermogenianus*, published in the following century. These were private compilations. The first official revision of the Imperial laws was made under the direction of the Byzantine Emperor Theodosius II. The *Codex Theodosianus* was published 438 A.D., not only in Constantinople, but also, by arrangement with Valentinian III, in Rome. The greater part of this code has come down to us. The fullest edition is by Hänel (1842). Some additional fragments have been edited by Krüger (1880). Theodosius had entertained, but did not carry out, a broader plan, involving an official digest of the older law, as set forth in the juristic literature. This plan was taken up by the Byzantine Emperor Justinian, and carried out under the direction of his minister, Tribonian. The law books published by Justinian were: 1. *Institutes* (Nov. 21, 533 A.D.). This book, which sets forth the elements of the law, is based on the *Institutes* of Gaius. It was intended primarily for law students, but it was published with statutory force. 2. *Digest* or *Pandects* (Dec. 16, 533), a full exposition of the older law, civil and prætorian. It is composed of excerpts from the juristic literature of four centuries (c.100 B.C. to c.300 A.D.)—chiefly, however, from the literature produced between 150 A.D. and 250 A.D. The greater part of the excerpts seem to have been reproduced without change; but antiquated terms were replaced by those current in the sixth century, and in some cases the passages quoted were condensed or amplified. Like the literature from which it was compiled, the *Digest* is substantially a collection of case law. 3. *Codex* (April 7, 529; "second reading," Dec. 17, 534), a revised collection of Imperial constitutions, based on the earlier codes and replacing them. The language of these law books is Latin, although some passages in the *Digest* and many of the constitutions in the *Code* are in Greek. During the remaining years of his reign Justinian issued many new constitutions (*novellæ*), mostly in Greek; but of these no official compilation was made. The combination of these "Novels" with the other law books of Justinian, under the general title *Corpus Juris Civilis*, dates from the twelfth century. The best edition is that by Mommsen and Krüger. There are complete French and German translations of the *Corpus Juris*, but only the *Institutes* have been translated into English (Moyle's *Institutes*, 2d ed., 1890). For the history of Roman law to Justinian, the best English work is by Muirhead, *Historical Introduction to the Private Law of Rome* (2d ed., Edinburgh, 1899).

V. *Roman and Teutonic Law in the Middle Ages.*—The law books of Justinian remained in force in the Byzantine Empire until the end of the ninth century, when they were condensed into a single Greek code, the *Basilica*. This, in its turn, remained nominally in force until the capture of Constantinople, by the Turks, in 1453; but, in fact, briefer private compilations were more generally used. One of these, the *Hexabiblos*, made in Thessalonica (Saloniki) in 1345, had legal authority in Greece as late as the nineteenth century. In the Teutonic kingdoms established on the ruins of the Western Roman Empire, the conquered Romans continued to live (at least in their relations with one another) by the Roman law; and in some cases official compilations of Roman law (antedating those of Justinian) were made for their use. The most important of these was the *Lex Romana Visigothorum*, compiled at Aire, in Gascony, under the authority of Alaric II and published 506 A.D., and commonly known as the "Breviary of Alaric" (q.v.). It included Imperial constitutions, a condensation of the *Institutes* of Gaius, and passages from Paul's *Sentences*. Until the eleventh century it was the principal source

from which Roman law was drawn in western Europe. Even earlier, in the reign of Euric (466–84), the Visigoths had begun to reduce their own law to written form, and their example was followed by other Teutonic tribes. So came into existence the *Leges Barbarorum* (as they were termed afterward), written in Latin, and exhibiting more or less Roman influence. The most important of these are: The *Lex Antiqua* of the Visigoths, the law of the Burgundians (*Lex Gundobada*), and the law of the Salian Franks (*Lex Salica*), all dating from the close of the fifth century; the law of the Ripuarian Franks, dating from the close of the sixth century; and the law of the Longobards, compiled in the seventh century. In Spain Visigothic legislation developed, in the course of the seventh century, into an elaborate code, the *Lex Visigothorum* (later known as the *Forum Judicum* or *Fuero Juzgo*). It is a blend of Teutonic, Roman, and ecclesiastical law, and it bound Goths and Romans alike. In the eighth century this national development was arrested by the Moorish conquest of the Iberian Peninsula. In the Frankish Empire (which, in the course of the eighth century, came to include all Christian Europe, except Great Britain and Ireland and the Byzantine Empire) the system of the "personal statute" prevailed; each German tribe lived by its own law, and the people representing the Roman element in Gaul, Burgundy, and Italy lived by Roman law. Here also, as in Spain, new law (in this case European law) was in process of creation by Imperial legislation (*capitularies*) and the decisions of the Imperial courts; but in the ninth century this development also was arrested by the disruption of the Empire. In the new nations in process of formation the royal authority was too slight either to enforce the old Frankish laws or to develop new national law. With the gradual disappearance of racial distinctions the *Leges Barbarorum* became obsolete, and the "personal statute" was supplanted by local law, largely customary in character. In southern France and in central and southern Italy, where the Roman element was strongest, the local laws were mainly Roman; in Germany and in northern France they were mainly Teutonic; in northern Italy and in Spain, Roman and Teutonic rules were more equally blended; but each local system, in the absence of any appellate jurisdiction, developed independently. Across these local differences ran class distinctions; there were separate courts and different laws for the nobles, the peasants, and the townsmen. In most of these courts judgments were rendered by men familiar with the customs of their locality or their class (*scabini, échevins, Schöffen*), but without other legal training. The most important body of written law produced in this period (except the canon law) was a twelfth-century Lombard code of feudal law (*Libri Feudorum*), which obtained great authority throughout Europe. Many city laws, and not a few territorial and local customs, were also put into written form, usually by private persons. Among the more important are the so-called *Etablissements de St. Louis* (1272 or 1273), the *Grand Coutumier de Normandie* (1270–75), and the *Mirror of the Saxons* (*Sachsenspiegel*, about 1230).

VI. *Canon Law.*—Throughout the Middle Ages there existed still another set of courts—viz., the ecclesiastical courts—applying a law which was not local, but European, and which bound all Christians. From the ordinary judge (*judex ordinarius*), the bishop, or his surrogate, appeals ran to Rome, and the interpretation of the canon law was kept uniform by the decisions of the papal Curia. In the Pope and the General Council the Church possessed also effective legislative organs. Canon law profoundly affected the development of European law in many matters; in particular, it gave Europe a common law of marriage and of family relations and rational forms of judicial procedure. For the development of the ecclesiastical law as a whole, and for its codification, see CANON LAW.

VII. *Reception of the Law Books of Justinian.*—Till the eleventh century, the only texts of Roman law that were much used in western Europe were the "Breviary of Alaric" and similar scanty compilations. In the eleventh century, however, the law books of Justinian were studied and used in Lombardy, in southern France, and in Barcelona; and there was a regular law school in which the laws of Justinian were taught at Pavia. Early in the twelfth century a more thorough and minute study of these texts, particularly of the *Digest*, was inaugurated at Bologna by Irnerius; the canon law was taught with equal thoroughness; and by the close of the century the University of Bologna had 10,000 students, drawn from all parts of Europe. Before the end of the thirteenth century law schools were established in 12 other Italian cities. From Italy the systematic study of the civil and canon laws spread through Europe. In Italy the text of Justinian was "glossed"—i.e., furnished with a running marginal commentary; and in the thirteenth century one Accursius digested the glosses of his predecessors and produced what came to be recognized as the standard commentary. The revival of the study of the law books of Justinian was followed, in many parts of Europe, by the "reception" of these books as authoritative law. Where, as in Italy and southern France, Roman law of a sort was already in use, the substitution of fuller and better texts was a simple matter, and here the reception came early. In Germany and the Netherlands it came late; it was not completed until the beginning of the sixteenth century. The reception was facilitated, especially in Germany and Italy, by the theory of "continuous empire," which viewed the Roman emperors as legal predecessors of the mediæval kings and princes. The reception, further, was in part the result, and in part the cause, of a gradual change in the organization of the courts, judges learned in the civil and canon laws taking the place of the *scabini*, or lay judges. The fundamental cause, however, of the reception of ancient Roman law was the inadequacy of mediæval law. The revival of commerce, in the twelfth and following centuries, and the social changes which ensued, necessitated a more highly developed law. The first result of the revival of commerce was the reception, throughout Europe, of the ancient law merchant, which had survived in the eastern Mediterranean region; but this law was applicable only to traders, and its reception did not solve the problems that were raised by the increasing importance of personal property. Hence the subsequent reception of the entire Roman private law. In those parts of Europe where economic conditions changed more slowly and local customs longer remained adequate—e.g., in

Switzerland, in the Scandinavian kingdoms, and in Russia—the law books of Justinian were not received. These countries became civil-law countries later, partly through the influence of the universities, partly by borrowing or imitating French and German legislation. A second and negative cause of the reception was the inability of the mediæval state to work out the new law that was required. In those countries in which central legislative power existed, or in which appeals were running to a supreme court, the law books of Justinian were not received. They were not received in England, nor in northern France, nor in Aragon; and in Castile the Roman law, as taught in the universities, was received only indirectly, in the form of an independent Spanish code—viz., the law of the "Seven Parts" (*Las Siete Partidas*), prepared under the auspices of Alfonso X (1252-82). Even in those countries in which the Imperial Roman law was not received in gross there was, nevertheless, more or less reception in detail; that is, special institutions and rules were borrowed. Where the law books of Justinian were received, they were applied: (1) as modified by the canon law; (2) as interpreted by the Italian commentators; (3) as subsidiary law, not overriding, but only supplementing, local laws. The judges trained in the Roman law were, however, not friendly to local laws. They insisted that such laws must be proved to be in force; and where the local law was unwritten, it was not easy to convince them of its validity.

VIII. *Modern Codification.*—In Spain and in France the earlier modern codes were collections of provincial and local laws—viz., the laws (*fueros*) of the different Spanish provinces and cities and the revisions of the same, dating from the thirteenth century to the nineteenth; and the customs (*coutumes*) of the French provinces, published under royal authority in the fifteenth and following centuries. In Germany and in Italy the earlier modern codes were state codes —e.g., those of Bavaria (1756), Prussia (1794), Baden (a translation of the Code Napoléon, 1809), and Saxony (1863); and those of the Two Sicilies (1819), Parma (1820), Piedmont-Sardinia (1837), and Modena (1851).

The principal civil codes now in force in Europe are national codes. The oldest of these is the French Civil Code, commonly known as the Code Napoléon, promulgated in 1804. It is still in force in Belgium, and it has served as a model for much subsequent codification, especially in Latin countries. The Austrian Civil Code dates from 1811. The Italian Civil Code was published in 1865; the Spanish Civil Code, in 1888-89; both of these are based upon the French Code. The German Civil Code was published in 1896, and has been in force since 1900. All of these codes, except the Spanish, have supplanted the older provincial and state codes; indeed, the chief object with which they were framed was to create common national law. Nearly all of the smaller European states have civil codes. In Switzerland, where cantonal codes are still in force, there is already a federal code of obligations, and a general civil code is in preparation.

In America, French law has been codified in Lower Canada (now the Province of Quebec; Code of 1865) and in Louisiana (Code of 1808, amended 1824, and since from time to time revised). In nearly all the Spanish-American states the civil law has been codified, with the Code Napoléon as the chief model. The more important of these codes are those of Bolivia (1831), Peru (1851), Chile (1855), Uruguay (1868), Argentina (1869), Mexico (1870, revised 1884), Colombia (1873, revised 1887) Identical with the Chilean Code, or based upon it, are the codes of Nicaragua (1867), Guatemala (1882), Salvador, Honduras, Venezuela (1880), Costa Rica (1884), Ecuador (1890). The Argentine Code was adopted by Paraguay in 1889. The Spanish Civil Code of 1889 is in force in Cuba, Porto Rico, and the Philippines. To this list of civil-law codes should be added the new Civil Code of Japan (1898), since its provisions, except as regards the family, are largely drawn from modern European codes. A general history of European law is yet to be written, although there are good histories of the law of Germany, Italy, France, Spain, etc. Consult Savigny, *Geschichte des römischen Rechts im Mittelalter* (2d ed., Heidelberg, 1834-51), which is still the most important general work. There are special works on the reception of Roman law by Schmidt (Göttingen, 1868) and Modderman (Groningen, 1874). See Howe, *Studies in Civil Law* (Boston, 1905).

CIVIL LIST. An annual allowance granted to the sovereign and the members of the royal family in constitutional monarchies, where the Parliament has obtained control of the purse. In England, down to 1660, the entire expenses of government, civil and military, were defrayed out of what was called the "Royal Revenue." This revenue, which arose partly from crownlands and partly from other sources, remained for a long period after the Conquest at the disposal of the crown; and even after supplies were voted by Parliament, the specific mode of their expenditure continued to be free from parliamentary control. After the accession of William III a distinction was drawn between the military and naval expenditure, which was henceforth voted by Parliament annually, and the Civil List proper, which included the maintenance of the royal household, the salaries of the judges, ambassadors, and such great officers of state, and such miscellaneous disbursements as the secret-service money and pensions. The Civil List was fixed at £600,000. Under William IV all salaries were transferred from the Civil List to the National Budget, and the royal grant placed at £510,000. Upon the accession of Victoria, the hereditary revenues of the crown were consolidated with the national domains, in lieu of which the sovereign was allowed an annual stipend of £385,000, to be devoted solely to the support of the royal household and the honor and dignity of the crown. Under the Act of 1901 the Civil List of the King was fixed at £470,000. The Act also provided for an annuity of £20,000 for the Prince of Wales and £10,000 for the Princess of Wales; also £6000 to each of the three daughters of the King. Under Act of 1910 the Civil List of the reigning King was fixed at the same figure as that of his predecessor. The British monarch also enjoys the income from the Duchy of Lancaster, varying from £50,000 to £60,000 annually. Of the sum represented by the King's Civil List, £110,000 is appropriated to the privy purse of the King and Queen; £125,800 for salaries of the royal household, etc.; £193,000 for household expenses. In all the countries of continental Europe, with the exception of Russia and Turkey, the sovereign

and the members of the royal family are provided for by a civil list, generally in proportion to the value of the royal possessions which they may have ceded to the nation. The income of European monarchs ranges from £250,000 in the case of the King of Denmark to £800,000, which represents the allowance made the King of Prussia.

CIVIL PROCEDURE. Legal procedure—the process whereby legal rights are protected and enforced, and violations of private or public rights punished. As commonly employed in English and American law, however, the term "civil" refers to private as distinguished from public rights, and civil procedure would not include the processes of the tribunals in protecting the peace and vindicating the dignity of the state, i.e., criminal procedure. Neither does it cover any administrative process of the state, nor diplomatic or other action for the purpose of protecting the interests of citizens or subjects in foreign lands. See PROCEDURE; INTERNATIONAL LAW.

CIVIL RIGHTS. See RIGHTS, CIVIL.

CIVIL RIGHTS BILL. In American history, a bill passed by Congress in 1866, as one of the Reconstruction measures of that body, for the purpose of securing an equality of civil rights to all citizens of the United States, and particularly for the purpose of placing the freedmen in the South on an equal political footing with the whites. Its main provision was as follows: "All persons born in the United States and not subject to any foreign power, excluding Indians not taxed, are hereby declared to be citizens of the United States; and such citizens of every race and color, without regard to any previous condition of slavery or involuntary servitude, except as a punishment for crime whereof the party shall have been duly convicted, shall have the same right, in every State and Territory of the United States, to make and enforce contracts, to sue, be parties, and give evidence, to inherit, purchase, lease, sell, hold, and convey real and personal property, and to the full and equal benefit of all laws and proceedings for the security of person and property, as is enjoyed by white citizens, and shall be subject to like punishment, pains, and penalties, and to none other, any law, statute, ordinance, regulation, or custom to the contrary notwithstanding." The other sections of the bill merely provided for the carrying out of this provision and fixed penalties for its infraction. The bill passed the Senate on February 2 by a vote of 33 to 12, and the House on March 13 by a vote of 111 to 38; was vetoed by President Johnson on March 27, and was passed over the veto by the Senate on April 6, and by the House on April 9. It was the subject of an animated debate both in and out of Congress, and the challenging of its constitutionality led to the passage and adoption of the Fourteenth Amendment. Another bill, of March 1, 1875, provided further for the rights of the blacks, prescribing that blacks should not be distinguished from whites by innkeepers, teachers or officers of schools, theatre managers, and common carriers; that Federal courts should have exclusive jurisdiction over infractions of the bill; and that negroes should not be excluded from juries. This law was declared unconstitutional in 1883 on the ground that it dealt with social and not civil rights. See RECONSTRUCTION.

CIVIL SERVICE. The civil service of a state is, properly speaking, the entire body of public officials charged with the duty of conducting its civil administration. As commonly employed, however, the term does not include members of the military and naval establishments, nor members of the legislative branch of the government; nor, generally, other elective officers. Indeed, in the popular connotation of the phrase, the direct representatives of the sovereignty, whether elective or appointive, are not usually included. Thus, neither the appointed members of the British cabinet nor the elected President of the United States would usually be described as civil servants; while there is no doubt that the Viceroy of India and the Civil Governor of the Philippine Islands, as well as the members of the President's cabinet, come under that designation. On the other hand, it is not usual to include within the description of the civil service mere laborers, though the method of their employment, their terms of office, and sometimes the nature of their duties, render it difficult to distinguish them from their coemployees of the state, who are undeniably within the common acceptation of the term.

The civil service of a modern civilized state is a very complex affair, consisting of a multitude of officers and civil servants of various grades, performing a great variety of highly differentiated functions, and grouped in various administrative departments. Some of the more important of these are modern additions to the functions of the state, while others are of great antiquity. Thus, the officers of the royal household in England, many of the officers of the courts of justice in Great Britain and the United States, can trace their offices back to the very beginnings of English history, while such great administrative departments as the post office, the British Board of Trade, the United States departments of agriculture, of commerce, and of labor, and the Interstate Commerce Commission are of recent origin. It is to the modern additions, especially to the institution of a postal service, that we owe the enormous increase in the number of public servants in the latter half of the nineteenth century. To this should be added, however, as contributing causes, the large increase in the number and size of cities in recent times, with the growing necessity for police protection, together with the assumption, by municipalities and by the state, of a variety of services and functions that were previously left to private enterprise; such as the cleaning of streets, the removal of waste, and the furnishing of a water supply in cities, and, in some countries, the building and management of telegraph lines, railways, and canals, and of irrigation works on a large scale, by the general government.

At the head of the British civil service stand the officers of the royal household, under several departments; then come the officers of the House of Lords and the House of Commons; then a vast number of offices or departments, of which the following are the more important: treasury, home office, foreign office, colonial office, India office, war office, admiralty, board of trade, post office, customs, inland revenue (including stamps, taxes, and excise), exchequer and audit office, office of woods and forests, office of works and buildings, Duchy of Lancaster, public-record office, local government board, education department, civil-service commission, registrar-general's office, stationery

office, ecclesiastical commission, charity commission, patent office, emigration office, Trinity House, herald's college, law and equity courts, ecclesiastical and admiralty courts, prisons department, British Museum, science and art department, diplomatic and consular corps. Several departments peculiar to Scotland and Ireland form distinct lists, not included in the above. The heads of most of the departments are political officers, changing with the ministry. Others, such as the head of the exchequer and audit department, or the commissioners of customs and of inland revenue, are permanent officials. Excluding the judicial offices, and a few departments where special knowledge is required, the civil service is open to the public generally, the principle of open competition being in force as regards most of the departments. See GREAT BRITAIN, *Government*.

The civil administration of the Federal government of the United States is confided to a body of upward of 300,000 officials. These are all included within the 10 general departments of the national government—the departments of state, justice, interior, war, navy, treasury, post office, agriculture, commerce, and labor—and Congress, though some of these contain a large number and variety of bureaus dealing with a great diversity of interests not logically related to the main business of the department. As examples of this incongruity, it is only necessary to mention the National Observatory, under the jurisdiction of the Navy Department, and the National Library, under that of Congress. The President is the great source of power in the American Federal system, all the officers of the government, excepting the Vice President, the members of the two Houses of Congress, and the employees of the latter, owing their offices to his appointment.

The curious identity of the governmental and administrative forms which have been adopted in the several States of the American Union is treated in the article UNITED STATES, section on *State Government*. The result of this identity is, of course, a great similarity in the civil service of the States. In most of the States the principal judicial officers and the heads of the great departments of administration, as well as the Governor and Lieutenant Governor, are chosen by popular vote. Generally, each elective officer has the power to name his own subordinates, the Governor's appointing power being limited to his own clerks and secretaries and to the officials of certain bureaus or commissions, which do not come under the jurisdiction of the constitutional departments of administration. The restricted character of the functions of the States in our Federal system has thus far furnished no occasion for an extensive civil service, and, accordingly, the number of persons employed in that service in the State governments is very small compared with the number employed in the Federal service. The establishment of a State constabulary, or police system, or the assumption by the Commonwealth of the ownership and operation of telegraphs, railroads, or other great industrial enterprises, would of course enormously increase the civil service of the State.

In the modern city, on the other hand, by reason of the great diversity and extent of the functions of municipal government in our day, the number of civil servants is very great and tends constantly to increase. Not only the purely governmental operations of a city government, as the maintenance of a police force and efficient local tribunals; not only its quasi-governmental functions, as the regulation and administration of a system of public instruction, the cleaning of streets, and the removal of waste; not only its gigantic business enterprises, as in supplying its citizens with water and gas, and the building and operation of bridges, systems of transportation, etc.; but also its administration of the property interests committed to its charge, as the docks, parks, streets, etc., call for a vast and complicated machinery of administration and an army of civil servants. American cities have generally reproduced, with great fidelity and uniformity, the type of municipal government brought over by our earliest city builders from England. The head of the administration is a mayor, elected by popular vote, and with him are usually chosen a treasurer, comptroller, or other financial officer, and sometimes other heads of departments. But generally the power of appointment vested in the mayor is a large one, and often it extends to the appointment of most if not all of the chiefs of the several administrative departments of the local government. See CITY; MUNICIPAL GOVERNMENT.

Local political divisions, such as counties, towns, parishes, and school districts, present a greater diversity of governmental form and administration; but in the United States the number of appointive officers in those divisions is small, and in a general view of the subject of civil service they do not call for special consideration.

The method of appointment to the public service and the tenure of the civil servant vary greatly in England, according to the historical character of the service; in the United States, according to the jurisdiction and the rank of the official. High officers of state are appointed in Great Britain by royal warrant; in the United States, by commission. In the former country the complexity of the service is great, many public officers deriving their status from long usage, and being attended with privileges and immunities of immemorial force. Many of them are for life, many have the personal quality associated with the feudal tenure of land, and some are hereditary. Indeed, by the common law of England, public office was a species of real property, held by a tenure, like land, and vesting in the incumbent an estate, either for life or in fee. Even as late as the middle of the eighteenth century, offices are enumerated by Blackstone in his classification of real property as one of the class of incorporeal hereditaments. (See OFFICE.) To-day, however, most of the positions in the public service in England and all offices in the United States are, in law, regarded as held in trust for the public benefit; and though an appointment to office usually vests in the incumbent a certain definite right to perform its duties and enjoy its emoluments, it no longer entitles him to make merchandise of it, to alienate it, or to transmit it to his heirs. All public offices in the United States being of comparatively recent origin and created by statute, there is much greater simplicity and uniformity in the mode of their creation and in the incidents of their tenure than in Great Britain. Comparatively few positions in the public service are held by a life tenure—the principal exceptions being high judicial positions in the Federal service and

in a few of the States. In many cases an office is held at the will of the appointing power, and by statute a large proportion of the positions in the Federal service are held by a four years' tenure. See TENURE-OF-OFFICE ACT.

The power of appointment to the public service, even when, as is usually the case, unrestricted in theory, may be practically limited by custom, by the despotism of political party control, or, as in the case of the President of the United States, by the operation of self-imposed rules. The British Parliament, and many of the United States, have enacted laws restricting the exercise of the power of appointments, and prescribing the qualifications for the civil service, and providing for an impartial method of selection among the candidates for office; and in several States these provisions have been embodied in the constitution. The object of these laws being to raise the moral tone and improve the efficiency of the civil service by eliminating, so far as possible, political motives for appointments, and by securing to the incumbents of public office independence of external control, whether personal or political, some form of the so-called "merit system" (q.v.) has generally been adopted. Similar boards exist in New York and in many other cities to govern appointments to municipal office. This system will be fully described under that title; but it may be noticed, here, that it is based on the principle of competitive examinations, conducted by a board of administrative officers known usually as "Civil-Service Commissioners." The results of the examinations and the rating of the candidates are reported by the Civil-Service Board to the appointing officer, who makes his selection from among the names so certified to him, as the law may direct.

The power of appointment being vested in the President of the United States by the Federal Constitution, it is not within the power of Congress to fetter his action by the enactment of similar laws. The merit system has, however, been extensively applied by the voluntary action of the President, most of the great departments of the government being now wholly or in large part under its operation.

In many of the States by law, and in some departments of the Federal administration by executive order, the independence of civil servants has been further secured by provisions restricting the power of removal from office, in many cases by providing for a definite tenure, and in others by requiring the removing officer to file his reasons for making the proposed removal, and to give the accused official an opportunity to be heard in his own defense. In still other cases, where the tenure is for life, or "during good behavior," the action of the removing officer may be reviewed by the courts, and the removed official reinstated if the grounds for the removal are deemed by the court to be insufficient. Generally, however, where the tenure is not permanent, the provisions above described operate solely as a check on hasty and inconsiderate action, and as securing to the civil servant reasonable notice and the consideration of his claims upon the office, and vest no power of review in the courts. It has been judicially determined that the civil-service rules promulgated by the President of the United States do not have the force of general law, and confer upon members of the service no right to invoke the aid of the courts to protect them against violation thereof. They are the President's law, and he alone can enforce them. The general effect of the adoption of the merit system and of the legislation last referred to has been most salutary. The evils at which these laws were aimed, and the history of the popular movement which resulted in their general adoption, will be found set forth in the article on CIVIL-SERVICE REFORM. See Ashley, *The American Federal State* (New York, 1902); Anson, *Law and Custom of the Constitution* (Oxford, 1892); Eaton, *Civil Service in Great Britain* (New York, 1880); Goodnow, *Comparative Administrative Law* (New York, 1893); Fairlie, *The National Administration of the United States* (New York, 1905); and the authorities referred to under CIVIL-SERVICE REFORM.

CIVIL-SERVICE REFORM. In the most general sense, the adoption, by legislation or executive action, of rules for improving the civil service of the state by prescribing the qualifications of candidates for public office, and for the good behavior of public servants and their independence of external control. Specifically, and as commonly employed in the United States, the expression refers to the movement of the last hundred years in Great Britain and the United States for the elimination from the public administration of the corrupting influences of party politics.

Owing to the power which has usually attended the possession of public office and the lack of any effective supervision or criticism, public administration has in all stages of political development been affected with corruption and inefficiency and extravagance. The various forms of autocratic government, which preceded the more popular governments of our day, furnished a peculiarly favorable soil for the growth of these evils. (See CIVIL ADMINISTRATION.) It was a disappointing result of the first effective appearance of government "by the people" in modern times, that it should not only have failed to correct these tendencies of the earlier régime, but should have intensified them and given them new and more enduring vitality. It is to the excessive and vicious development of the party system in its earlier stages that we owe this condition of affairs. Human nature is much the same under all forms of government; and it is, therefore, not to be wondered at that great party leaders, like Bolingbroke and Walpole, having great patronage at their command, should employ it to consolidate their power or that of their party. The "spoils system," as it is called in the United States, had its inception with the real beginning of popular government, in the reign of William III. William III was himself a great administrator, and his first efforts were directed to a reform in the public service. But the only permanent "reform" effected was the substitution of Parliament for the crown as the source of office and official corruption. At the accession of Anne in 1702 the party system had enveloped the whole civil service of Great Britain. All of the offices of state and all employments under them, from the highest to the meanest, were the assets of the party in power and were available for party purposes. The results of the system were in the highest degree demoralizing to the public administration and to the public spirit of the nation. As has been well said of this period in England, "the partisan system of appointments and promotions aggravated the evils of parlia-

mentary patronage, made administration costly and feeble, spread corruption from the departments to cities, boroughs, and elections, while it disgusted the better class of citizens, alarmed statesmen, and exasperated and debased all political contests." Matters grew steadily worse through the early part of George III's long reign, the efforts of Rockingham, Burke, Pitt, and other patriots to stay the tide of corrupt practices being neutralized by the stubborn resistance of the King. The tide turned, however, with the coming in of the second Rockingham ministry in 1782, and when George IV ascended the throne, in 1820, though the partisan system still existed, its worst abuses had been driven out by the growth of a better public sentiment. The great Reform movement which culminated in 1832 had no direct concern with administration and produced no immediate effect on the movement for administrative reform; but the "merit system" of selecting candidates for office was tried on a small scale as early as 1834 and slowly but steadily made its way. It was probably the demoralization of the Indian service which opened the eyes of British statesmen to the necessity for more sweeping methods of reform; and after securing the passage of the India Act of 1853, the government of Lord Aberdeen appointed a commission, consisting of Sir Stafford Northcote and Sir Charles Trevelyan, to make an inquiry into the condition of the public service and to suggest improvements therein. This commission having in the same year reported, recommending a uniform system of competitive examinations to test personal fitness for the public service, in 1855 such a system was established by the ministry of Lord Palmerston, through an order of the Queen in Council. This sweeping reform, which has proved to be as permanent as it has been salutary, was brought about by the wisdom and experience of the administration, in the face of a hostile majority in Parliament and an apathetic public opinion. The beneficial effects of the new system quickly became apparent, and in the extremely short space of four years had roused a strong public sentiment in its favor and won the unanimous support of Parliament, and in 1859 was fully legalized by statute. The last step in the reform of the British civil service was taken in 1870, when the competition, previously somewhat restricted, was thrown open by an order in Council to all persons of requisite age, health, and character.

The "spoils system" and its reform have had a shorter and a more recent history in the United States. It was instituted by President Jackson in 1829, as an incident of his bitter and proscriptive campaign for the presidency, at a time when it was already on the wane in Great Britain. The doctrine enunciated in the notorious declaration of Senator Marcy, that "to the victor belong the spoils of the enemy," rapidly became the accepted principle of political action in the United States, and represents a more thoroughgoing and vicious form of the system than ever existed in England. In England, as in the United States, office was the reward of party service; but the principle of the "clean sweep," whereby an incoming administration makes room for its supporters by the wholesale removal of the incumbents of the public service, was the exclusive possession of the American Republic. So well adapted did this principle prove itself to the American party system, that it spread rapidly from the national government to the several States until it permeated the entire public life of the country. So firmly did it become intrenched in the civic life of the American people, that it has been affectionately described and defended by its supporters as the "American system." Its essentially artificial character is evidenced by the fact that in the 40 years from the beginning of Washington's administration to that of Jackson, not a single subordinate officer of the government was removed without cause, while in Jackson's first term the number of such removals rose to thousands.

This was not accomplished without protest, however. The new principle was vigorously combated in the Senate of the United States by Clay, Webster, Calhoun, and other leaders—the first of whom denounced it as "a detestable system, drawn from the worst periods of the Roman Republic." But nothing availed to stay the tide, and for 40 years more no President raised his voice against the system or failed to act upon it. But the sentiment in favor of reform was slowly gathering force, and in 1867 it found its first effective expression in a report to the House of Representatives, made by Mr. Thomas A. Jenckes of Rhode Island, recommending the establishment of a merit system, based upon competitive examinations. A second report, recommending similar action, was made by Mr. Jenckes the next year, but it was not until 1871 that the growing force of public opinion compelled Congress to take action upon the subject. In that year a clause in the general appropriation bill authorized the President to prescribe rules for admission to the civil service and to appoint a commission for that purpose. President Grant thereupon appointed the first Civil-Service Commission, with George William Curtis as chairman, and in December of the same year the commission reported, recommending a set of rules and regulations. This report was adopted and the rules and regulations of the commission put into effect, and thus the first victory for Civil-Service Reform was won. These rules, with certain additions to them recommended by the commission in the spring of 1872, remained in force until the winter of 1875, when the growing opposition of the politicians induced Congress to withhold the annual appropriation for the working of the system, and the President yielded to party pressure and suspended the operation of the Civil-Service Rules.

The most memorable event in the long struggle for the reform of the civil service in the United States was the organization of the Civil-Service Reform Association in New York in May, 1877. This organization, and the National Civil-Service Reform League into which it developed, under the presidency of Mr. Curtis, instituted an active propaganda for the creation of a public sentiment in favor of the reform, and by its meetings and public addresses, and by the high and disinterested character of the men who were prominent in its work, powerfully stimulated the movement. After this the triumph of the reform was not long delayed. In January, 1883, the bill introduced by Senator Pendleton, of Ohio, which, in the language of the National Civil-Service Reform League, provided "a constitutional, practical, and effective measure for the remedy of the abuse known as the spoils system," was adopted by overwhelming majori-

ties of both Houses of Congress, and the "merit system" was an established fact. The Civil-Service Law, which went into effect in July, 1883, prohibited the vicious practice of levying assessments for partisan purposes upon members of the civil service of the government, authorized the appointment of a commission to frame rules and regulations for the civil service, and empowered the President, from time to time, to determine by executive order what classes of the public services should come under the operation of such rules. In the same year a similar bill, applying the same principles to the civil service of the State of New York, was passed by the Legislature and became a law, and in the following year the system was extended by statute to the 23 incorporated cities of that State. In 1884, also, the new system was adopted in Massachusetts. The reform of the civil service was now secure, but still far from complete. The President (Arthur), who had himself, as a New York politician, been a devoted adherent of the old system, nevertheless administered the new one faithfully; but it was deemed expedient to proceed slowly in its application, and only 14,000 employees of the government were at first brought within the "classified service." It must be said that the high tide of public feeling which resulted in these sweeping victories for the movement has never been reached again, and that the active hostility of party leaders has greatly retarded its progress. The new system has made gains; it has been adopted in whole or in part in a few more States, and it has been extended by executive order of the President to classes of public servants not previously affected by it, but in many of the United States the political "machine" has been strong enough to maintain the old system unimpaired, and in many others there is a complete absence of popular feeling on the subject. In other words, the political development of the American people has not yet reached the point, attained by the English electorate a generation ago, of recognizing the supreme importance of clean and efficient administration to the welfare of the State. Much of the progress of the past 30 years has been due to the cautious initiative of enlightened presidents, especially of Cleveland, Harrison, and Roosevelt, the last of whom has long been known as a devoted friend of the reform movement, and, as Civil-Service Commissioner under President Harrison, did much to commend the new system to the American people. President Taft, at the close of his administration, transferred the fourth-class postmasterships to the classified service; an act accepted by the administration of President Wilson with the qualification that all persons in that service, not appointed originally under a merit system, should be required to establish their right to their positions through competitive examinations. The nature of the "merit system" and its operation will be described under that title. The character of the partisan system will be found discussed in the article on the SPOILS SYSTEM. See also CIVIL SERVICE; and consult: Eaton, *Civil Service in Great Britain: A History of Abuses and Reforms and their Bearing upon American Politics* (New York, 1880); George William Curtis, *Orations and Addresses*, vol. ii (New York, 1894); Theodore Roosevelt, *American Ideals*, part ii (New York, 1900); Bain, *Practical Essays* (London); Clarke, *Civil-Service Law* (3d ed., New York, 1897); Fish, *The Civil Service and the Patronage* (New York, 1905); and the reports of the American Civil-Service Reform Association; *Annual Reports of the United States Civil-Service Commission* (Washington, 1884–).

CIVIL WAR IN AMERICA. The conflict between the Northern and Southern States of the Union, in 1861–65, ostensibly and immediately occasioned by disagreement between the two sections on the subject of the control of slavery, but perhaps not less the result of long-standing differences in political and economic theories. The public agitation of the Abolitionists; the nomination of antislavery candidates for the presidency, at each election, from 1840; the introduction in Congress of the "Wilmot Proviso" (q.v.) in 1846; the passage of the Fugitive Slave Law in 1850, and the incidents connected with its enforcement; the repeal of the Missouri Compromise in 1854; the "Dred Scott" case (q.v.) in the United States Supreme Court in 1857; the adoption of the Lecompton Constitution for Kansas in 1858; the John Brown raid at Harper's Ferry in 1859—served to force slavery into conspicuous notice as the leading political issue, to accentuate the irreconcilable divergence of beliefs relative thereto, and to intensify the bitterness which rendered a peaceful settlement of the problem still more difficult. The projection into politics of a sectional issue served to divide the only party that still retained a following both North and South—the Democratic—and to bring about the nomination of four presidential candidates in 1860; Stephen A. Douglas, of Illinois, and John C. Breckenridge, of Kentucky, who were nominated by the two wings of the Democratic party; John Bell, of Tennessee, who was nominated by the so-called Constitutional Union party; and Abraham Lincoln, of Illinois, who was nominated by the Republican party. Abraham Lincoln was elected President, exclusively by the votes of the North; and the immediate effect of his election was to precipitate the secessionist movement. A State convention met at Charleston, December 17, and on the 20th passed an ordinance declaring that "the union now existing between South Carolina and other States, under the name of the United States of America, is hereby dissolved." This example was followed by acts, similarly phrased, passed by conventions of 10 other Southern States, in the following order: Mississippi, Jan. 9, 1861; Florida, January 10; Alabama, January 11; Georgia, January 19; Louisiana, January 26; Texas, February 1; Virginia, April 17; Arkansas, May 6; North Carolina, May 20; Tennessee, June 8. The States of Missouri, Maryland, and Kentucky were divided in sentiment on the question of secession, and in the ensuing war had representatives in the governments and armies of both sections. The western counties of Virginia remained loyal to the Union and separated themselves from the rest of the State. On Feb. 4, 1861, a Congress met at Montgomery, Ala., in which were represented all the States that had passed ordinances of secession previous to that date. This Congress adopted for the new organization a Provisional Federal Constitution, which was later ratified, and the title "Confederate States of America." Jefferson Davis, of Mississippi, was elected President, and Alexander H. Stephens, of Georgia, Vice President, of the new Confederacy. In the meantime the State forces of South Carolina had seized the

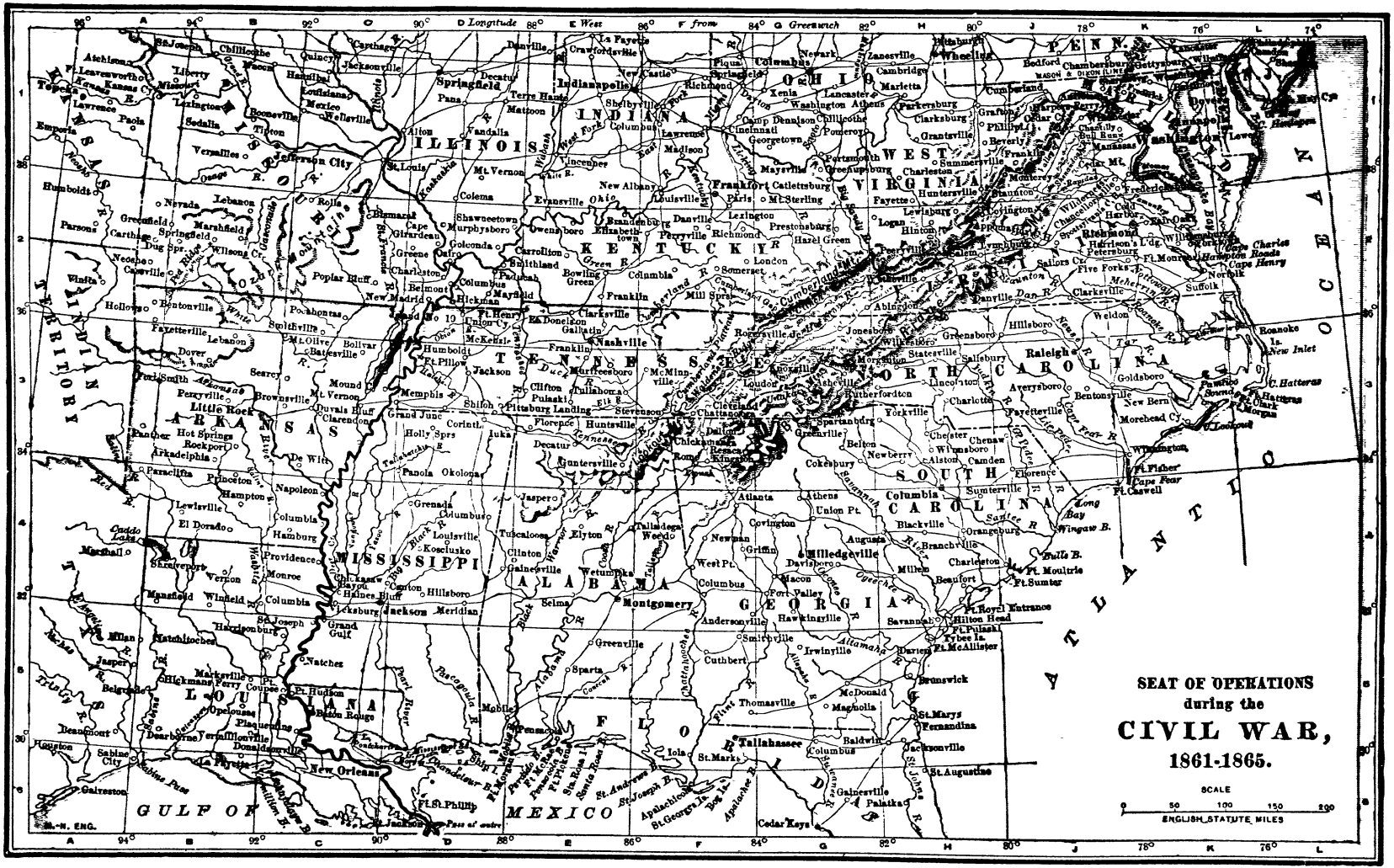
United States Customhouse, Post Office, and Arsenal in Charleston, and had taken possession of Forts Pinckney and Moultrie in the harbor of that city; Major Robert Anderson, in command of Fort Moultrie, with a force of only 128 men, many of whom were noncombatants, having withdrawn to Fort Sumter, which he considered more defensible. On April 12, 1861, hostilities began with the bombardment of Fort Sumter, which, after a brave defense, although several times set on fire by shells, was surrendered on the 14th by Major Anderson—the small garrison withdrawing with the honors of war. There were no casualties on either side. On the day following this event, President Lincoln issued a proclamation calling for 75,000 volunteers for three months; this was followed by a proclamation declaring the blockade of the Southern ports: and on May 3 a second call was issued for 64,000 men for the army and 18,000 for the navy, to serve "during the war." The United States regular army consisted, Jan. 1, 1861, of 16,402 officers and men; but these had been dispersed by John B. Floyd, Secretary of War under Buchanan, to distant parts of the country. Under his directions, also, quantities of arms and ammunition had been transferred from Northern to Southern arsenals during 1860; and the ships of the United States navy were mostly absent at foreign stations by direction of the Secretary of the Navy, Toucey. A very large proportion of the Southern army officers resigned and entered the Confederate service, though this course was by no means so general on the part of Southern officers in the navy. In the Southern States preparations for war were carried on with great energy. Gen. Robert E. Lee was appointed commander in chief of the Confederate forces in Virginia, their main body being concentrated at Manassas Junction. On June 10 a Union force was repulsed by the Confederates at Big Bethel, Va. (q.v.), and on July 21 was fought the first battle of Bull Run (q.v.), when the Confederates, under Generals Johnston and Beauregard, completely defeated the Federals, under General McDowell, and threatened the capital. This was the first important battle of the war, and its effect was to rouse both sides to what now promised to be a long and bloody struggle. Meanwhile General McClellan (q.v.) had succeeded in wresting the western portion of Virginia from the Confederates; and immediately after the disastrous defeat at Bull Run he was appointed commander in chief of the Army of the Potomac. His skill in organizing and disciplining large bodies of men, and making valuable soldiers out of raw and inexperienced recruits, doubtless qualified that army for the magnificent part it afterward took in the war.

The Congress of the United States met in extra session July 4, 1861, and, in response to the President's call, voted 500,000 men and $500,000,000. The Northern States, in their individual capacity, had before this time drawn upon their own resources in behalf of the Union cause—New York and Pennsylvania each voting $3,000,000 for the prosecution of the war; Massachusetts and other New England States sending regiments into the field fully armed and equipped; while in every city, town, and village volunteers were gathering and forming themselves into companies and regiments, to be afterward offered to the governors of the respective States, and through these officials to the country. The latter half of the year 1861 was devoted mainly to organization, and the engagements that occurred were generally without great importance. At the South the enlistment of 400,000 men was going on under a call from the Confederate Congress. The Confederates also had possession of the United States Arsenal at Harper's Ferry and of the Navy Yard at Norfolk, Va., where they had seized 2000 cannon and the steam frigate *Merrimac*, one of the finest in the United States navy. General Lyon succeeded in securing Missouri for the Union by a series of engagements, which terminated, however, in the defeat at Wilson's Creek (near Springfield), August 10, in which he fell. On October 21 the Confederates gained a success by almost annihilating the Federal force of 1500 to 1700 men which had been sent to Ball's Bluff (q.v.) on the Potomac and left there unsupported. Gen. U. S. Grant, after having seized Paducah, at the mouth of the Tennessee River, and another important strategic point at the mouth of the Cumberland, captured, on November 7, the Confederate camp at Belmont, Mo., though he was soon driven back by the Confederate General Pillow, acting under orders from General Polk. On the same date a United States naval force under Admiral Dupont captured Forts Walker and Beauregard at Port Royal, S. C. On the following day the Confederate commissioners, Mason and Slidell, were taken, by Captain Wilkes of the United States frigate *San Jacinto*, from the British mail steamer *Trent*, while on their way to their respective missions to England and France. Complications with England were averted by the prompt disavowal of Captain Wilkes's act by the United States government. The Federal force in the field in the beginning of 1862 was about 450,000 men; the Confederate force about 350,000. During January some successes were gained in Kentucky, at Prestonburg and Mill Springs, by the Federals, under Colonel Garfield and General Thomas. General Grant, aided by a naval force under Commodore Foote, captured Fort Henry, on the Tennessee River, February 6; and 10 days later General Grant attacked Fort Donelson, on the Cumberland, which surrendered with nearly 15,000 prisoners and 40 cannon. A naval expedition under General Burnside and Commodore Goldsborough captured Roanoke Island, Newbern, N. C., on February 8. On March 7–8 occurred the battle of Pea Ridge, in western Arkansas, in which the Federals under Gen. S. R. Curtis defeated the Confederates under Gen. Earl Van Dorn. On March 9 the Confederate ironclad *Virginia* (formerly the *Merrimac*), after having on the preceding day inflicted great loss on the wooden vessels of the Union squadron in Hampton Roads, was herself defeated in a remarkable naval engagement by the newly constructed *Monitor*, under Worden. In the West the Northern campaign was directed towards opening the Mississippi, and towards cutting the Memphis-Charleston railroad line. In the course of the southward movement for the latter purpose, General Grant fought the great two days' battle of Shiloh (or of Pittsburg Landing), on the Tennessee River, April 6–7. On the first day the attack of the Confederates, under Generals A. S. Johnston (who fell) and Beauregard, threatened the destruction of the Union force, but on the second day Grant, reënforced by Buell, drove the enemy from the field. In this theatre of the

war, at the close of the following month, the Federals, under Halleck, compelled the evacuation by Beauregard of the important strategic point of Corinth, Miss. On April 8 General Pope and Commodore Foote captured Island No. 10 (q.v.), in the Mississippi River. Fort Pulaski, near Savannah, Ga., was bombarded and captured by Major Gillmore, April 11; and at the close of this month New Orleans was captured by Farragut and occupied by Northern forces. The Army of the Potomac, which had devoted its time during the winter of 1861–62 to organization, moved early in the spring to the peninsula formed by the James and York rivers, and gained an equivocal success at Williamsburg, Va., May 5. The army then advanced up the peninsula to the Chickahominy, and won the battle of Fair Oaks (Seven Pines), on May 31–June 1, against Gen. Joseph E. Johnston, but the approach of "Stonewall" Jackson, with a force fresh from a victorious advance through the Shenandoah valley, to coöperate with Lee, made it necessary, in the judgment of McClellan, to effect a change of base to the James River; and this hazardous movement was accomplished at the expense of some of the hardest-fought engagements of the war, known collectively as the Seven Days' Battles —those of Oak Grove, June 25, Mechanicsville, June 26; Gaines's Mill, June 27; Savage's Station, June 29; Frazier's Farm, June 30; and Malvern Hill, July 1. In July, Halleck was appointed commander in chief of the Union armies, but he did not assume personal command. As a result of the peninsula movement and the "change of base," the advantage remained with the Confederates, who had successfully defeated the original plan for the capture of Richmond by this route. The scene of the Eastern campaign was thus again shifted to northern Virginia, and on August 29–30 occurred the second battle of Bull Run (q.v.), between the Federal forces commanded by Gen. John Pope and the Confederates under Lee, Jackson, and Longstreet. Pope was utterly defeated, and his broken and dispirited columns were driven back upon Washington. Lee now undertook the invasion of the Union territory, and crossed the Potomac into Maryland. McClellan encountered him successfully at South Mountain, September 14, and definitively checked his progress in the severe battle of Antietam, September 16–17, forcing him to retreat across the Potomac. Harper's Ferry, which had been evacuated by the Confederates in June, 1861, was recaptured by Stonewall Jackson (q.v.), Sept. 15, 1862, when 11,583 men and a great quantity of munitions of war fell into the hands of the Confederates. On September 22 President Lincoln issued a proclamation decreeing the emancipation on Jan. 1, 1863, of all slaves in the States which should till then continue in a state of rebellion. This was followed on January 1 by a proclamation definitively emancipating the slaves in the rebellious States. On Nov. 7, 1862, General McClellan was superseded in the command of the Army of the Potomac by General Burnside, against the wish of the latter, who was defeated disastrously at Fredericksburg, Va., December 13. (See FREDERICKSBURG.) On Jan. 26, 1863, General Burnside was relieved by General Hooker, who was defeated by Lee in a great battle at Chancellorsville (q.v.) on May 2–4. The death of Stonewall Jackson made the victory a dearly bought one for the Confederates. Lee followed up this success by invading Maryland again, and early in June entered Pennsylvania. On June 28 Hooker was relieved from the command of the Army of the Potomac by Gen. George G. Meade (q.v.), and the latter at once pursued the Confederates with such celerity and determination that Lee was forced to stop and give battle. The two armies met in the great battle of Gettysburg, which lasted July 1–3. General Reynolds was killed during the first day's fight, and on the last day General Hancock was dangerously wounded. The result of the three days' battle was a most complete Federal victory. Lee, having recrossed the Potomac, now retreated to a position on the Rapidan, and strategic movements on the part of the two armies, accompanied by occasional heavy skirmishing, occupied the time until winter. In the southwest, since the close of 1862, the main operations had centred about Vicksburg, converted by the Confederates into a great stronghold. After various attempts at its capture had failed, General Grant, by a series of brilliant strategic movements, succeeded in May, 1863, in closely investing the city, and on July 4, almost at the moment of the victory of Gettysburg, General Pemberton was forced by famine to surrender the place with his army of 30,000 men. The fall of Port Hudson, July 8, secured the complete control of the Mississippi by the Union forces and thus separated the two sections of the Confederacy. The struggle for the middle ground of Kentucky and Tennessee was marked by the battles of Perryville, Oct. 8, 1862, and of Murfreesboro, Dec. 31, 1862, and Jan. 2, 1863, with a result favorable to the Federals. On Sept. 9, 1863, General Rosecrans occupied Chattanooga. On September 19–20 he fought a bloody battle at Chickamauga and was defeated, the heroic stand made by General Thomas alone saving the Union army from destruction. This reverse was more than redeemed by the great victory of Grant over Bragg at Chattanooga (November 23–25—storming of Lookout Mountain, November 24, and of Missionary Ridge, November 25). This made it possible for Sherman to raise the siege of Knoxville, where General Burnside had been hard pressed by the Confederates under Longstreet. At the close of the year the Federal forces held Missouri, Arkansas, Kentucky, Tennessee, a large part of Louisiana, Mississippi, and Florida, and the Rio Grande frontier of Texas, and had control of the Mississippi River. A draft in the Northern States for 300,000 men, with an exemption clause, had added 50,000 men to the Federal armies.

In the early part of 1864 General Banks, assisted by Gen. A. J. Smith and a fleet under Admiral Porter, undertook an expedition up the Red River. A defeat at the hands of Generals Kirby Smith and Richard Taylor at Sabine Cross Roads, April 8, ruined the prospects of the expedition, which ended in complete failure.

General Grant was made lieutenant general and commander in chief in March, 1864. He turned over his command in the West and South to Sherman and took personal command of the armies of the East. A combined movement against the two remaining armies of the Confederates, those of Lee and Johnston, was now to be made under the personal direction of these two great generals. Sherman's army was in


SEAT OF OPERATIONS
during the
CIVIL WAR,
1861-1865.
SCALE
0 50 100 150 200
ENGLISH STATUTE MILES
ILLINOIS
INDIANA
OHIO
KENTUCKY
TENNESSEE
MISSISSIPPI
ALABAMA
GEORGIA
FLORIDA
SOUTH CAROLINA
NORTH CAROLINA
VIRGINIA
WEST VIRGINIA
PENN.
MISSOURI
ARKANSAS
LOUISIANA
INDIAN TERRITORY
GULF OF MEXICO
ATLANTIC OCEAN

motion from Chattanooga by May 7, and forced General Johnston through Georgia as far as Atlanta, defeating the Confederates at almost every point in a series of vigorous engagements, including those at Dalton, Rome, and Resaca, though he met with a severe defeat at Kenesaw Mountain. General Hood, who now replaced General Johnston, made repeated but disastrous attacks upon Sherman's forces (July 20, 22, 28) and, after being beleaguered in Atlanta, evacuated the city, which was occupied by Sherman on September 2. In the meantime the Army of the Potomac, with General Meade in immediate command, had broken camp on the Rapidan and undertaken the tremendous campaign of the Wilderness, with the design of forcing the fighting straight to Richmond. During this campaign of 43 days, fully 130,000 men on the Federal side and about 70,000 men on the Confederate side, with constant reenforcements, were engaged almost continuously. On May 5-6 was fought the battle of the Wilderness, which was followed by the battles of Spottsylvania Courthouse, the sharp engagement on the North Anna, and the terrible repulse of the Federal army at Cold Harbor on June 3. Finally, on the night of June 12, the Army of the Potomac crossed the Chickahominy and took position on the south side of the James River. The design of this movement was to threaten Richmond by way of Petersburg; and, to thwart it, Lee at once threw a large portion of his army within the defenses of the latter city, which proved to be impregnable to assault, and only to be reduced by regular approaches and a skillful siege. The regular investment of Petersburg was begun on June 19. While this protracted siege was in progress, the Confederate General Early made a rapid movement across the Potomac, achieving a success on the Monocacy, July 9, and threatening Washington itself. He then withdrew into the Shenandoah valley, and engaged in a vigorous campaign against General Sheridan, which ended, after a defeat near Winchester on September 19, in General Early's utter rout at Cedar Creek October 19. On June 19 the *Kearsarge* ended the destructive career of the Confederate cruiser *Alabama*, by sinking her off Cherbourg, France. In the month of August Admiral Farragut forced his way into Mobile Bay and defeated the Confederate squadron. General Sherman set out from Atlanta on his famous "March to the Sea" on November 15, carrying his compact army of 60,000 men through the heart of Georgia, and occupied Savannah on December 21, after carrying Fort McAllister by assault on the 13th. While Sherman was thus successful, General Hood had invaded Tennessee, driving the Federal forces before him. His movement ended in the battle of Nashville, December 15–16, where his army was destroyed by General Thomas. Thus at the close of the year the Federal forces were in possession of a large portion of the South, and Sherman was in a position to have the coöperation of the navy, and thus to move northward securely, so that he and Grant might hold between their two armies the weakened forces of both Lee and Johnston. In 1864 Abraham Lincoln was renominated by the Republicans, and General McClellan was nominated by the Democrats, who put forth a platform declaring the war a failure. Twenty-five States took part in this election; the electoral vote was 233, of which Lincoln received 212; the popular vote of Lincoln and Andrew Johnson, of Tennessee, was 2,223,035, and that of McClellan and Pendleton 1,811,714. During the latter part of December and January, General Sherman had remained in Savannah, resting his troops; but on Feb. 1, 1865, he again took the field. Marching through South Carolina, he took possession of Columbia on February 17, and on the following day Charleston, which had been besieged since 1863, was occupied by the Federals. Sherman now pushed on into North Carolina, where, on January 15, Fort Fisher, near Wilmington, had been captured, and where now two other Federal armies—under Schofield from Newbern, and Terry from Wilmington—coöperated with him, the three armies meeting at Goldsboro, N. C. Gen. J. E. Johnston, with the main army of the Confederates in that region, made an ineffectual attempt to check Sherman's advance at Bentonville, N. C. On March 24 General Grant issued an order for a combined movement of the armies operating against Richmond, to take place on the 29th. But on the 25th General Lee made a desperate attempt to break through the Federal line on the Appomattox River, and Fort Stedman was captured by the Confederates, only to be immediately retaken. On March 31–April 1 General Sheridan defeated the Confederates at Five Forks, which protected the South-Side Railroad, and thereby Lee's connections with Richmond, and captured 6000 prisoners. This was the final and irretrievable blow to the Confederate army. On the following day, April 2, General Grant attacked along the whole line in front of Petersburg, and on the evening of that day both Petersburg and Richmond were abandoned. General Lee retreated towards Lynchburg, but was intercepted by Sheridan, and on April 9 surrendered his army to General Grant at Appomattox Courthouse. General Johnston finally surrendered his army on April 26, although he had practically surrendered eight days earlier. On May 4 General Taylor surrendered the Confederate forces in Alabama to General Canby. The last fight of the war took place, May 13, 1865, on the Rio Grande. The last Confederate army in the field—the trans-Mississippi—was surrendered by Kirby Smith, on May 26. At the moment of final victory occurred the assassination of President Lincoln, on April 14.

The number of Federal soldiers in the field during the war was 2,666,999, the number drafted and held to service being 43,347; furnished substitutes, 73,607; paid commutation, 86,724; total drafted, 206,678, to which should be added 87,588 credited to the States under the draft of 1862; making in all, drafted, 294,266. The amount of commutation moneys received by the government was $26,366,316.78; the amount of bounties paid by the United States government was $300,223,500; by State and local authorities, $285,941,036. The casualties in the Federal army numbered 359,528; 110,070 men were killed in action or died of wounds; and 249,458 men died from disease, accident, or other causes. The entire available force capable of active service in the field, enrolled in the Confederate armies, was about 500,000 men, the number of enlistments being estimated from 1,239,000 to 1,400,000. Their entire loss in killed and wounded during the war was about 95,000 men; that from disease, accident, and other causes probably amounted

to 164,000. During the war Confederate cruisers, fitted out mostly in British ports, scoured the ocean, doing irreparable damage to the commerce of the United States. (See ALABAMA CLAIMS.) After the evacuation of Richmond, Jefferson Davis, President of the Confederacy, fled south, and was captured May 10, 1865, at Irwinville, Ga., by General Wilson's forces, as he was attempting to make his escape farther south. In company with certain others of the prominent leaders of the Confederacy, he was imprisoned for a time, but was not eventually punished. See NULLIFICATION; RECONSTRUCTION; UNITED STATES; LINCOLN; GRANT.

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CIVIL WARS IN FRANCE. A play by Dekker and Drayton, produced in 1598.

CIVIL-WAR VETERANS, SOCIETIES OF. Associations of veterans of the United States Civil War or their descendants. The predominant purpose of these associations is social; occasionally, however, political aims have been added, as in the case of the Grand Army of the Republic, which has striven successfully for the increase of the pension list and rate, and has become recognized as a considerable factor in national politics. The oldest of the Civil War associations is the Military Order of the Loyal Legion. (See LOYAL LEGION.) Membership in this society is restricted to officers of the army, navy, and marine corps, and to their oldest male lineal descendants; thus following closely, in organization, the Society of the Cincinnati. The most influential as well as the largest of the societies of the Civil War is the Grand Army of the Republic (q.v.). This organization admits to membership any soldier or sailor of the army, navy, or marine corps who was honorably discharged. It has two auxiliary organizations, known as the Woman's Relief Corps, which admits to membership mothers, wives, daughters, and sisters of Union soldiers, and the Sons of Veterans, which is composed of lineal descendants of those who served in the Civil War. Similar to the Grand Army is the Union Veteran Union (see VETERAN UNION, UNION), the membership clause of which, however, is more exacting, requiring service for a term of three years. This society also has an auxiliary society, known as the Ladies of the Union Veteran Union, and the Loyal Guard, for its junior male members. The Union Veteran Legion (see VETERAN LEGION, UNION) admits to membership only participants in some battle who possess an honorable discharge from the army. In addition to the foregoing, there are three special organizations, whose character is indicated by their names. They are: The Society of the Army of the Tennessee, organized on April 14, 1865; the Society of the Army of the Cumberland, organized Feb. 6, 1868; and the Society of the Army of the Potomac, organized Sept. 2, 1868. There was formerly a Society of the Army of the James, but that was merged, in 1876, into the Society of the Army of the Potomac. There are also numerous corps societies, such as that of the Eleventh Army Corps and the Sixth Army Corps, which hold annual meetings, and whose work has consisted largely in the erection of monuments on various battlefields and in other places to the memory of their leaders. The National Association of Naval Veterans (q.v.) admits to membership any appointed or enlisted man who served in the navy during the period of the Civil War. The Union Society of the Civil War was founded in 1907 to perpetuate the memory of those who, outside the regular service of the army and navy, rendered aid to the Union during the war. The memory of the Civil War is preserved in the Southern States through the instrumentality of three flourishing organizations, known as the United Confederate Veterans (see CONFEDERATE VETERANS, UNITED), which admits

to membership actual participants in the Civil War; the United Sons of Confederate Veterans (see CONFEDERATE VETERANS, UNITED SONS OF), which was organized by the male descendants of the Confederates; and the United Daughters of the Confederacy (see CONFEDERACY, UNITED DAUGHTERS OF THE), which admits to membership the widows, wives, mothers, sisters, and lineal female descendants of those who served in the Confederate armies. There are various other societies which, while they do not restrict their membership to participants in the Civil War, admit to membership participators in that conflict or their descendants. Of this character are the Military Order of Foreign Wars (see FOREIGN WARS, MILITARY ORDER OF), the Naval Order of the United States (q.v.), and the Medal of Honor Legion (q.v.).

CIVITÀ CASTELLANA, chē'vē-tä' käs'tĕl-lä'nä (It., castle city). A city in central Italy, about 27 miles north by west of Rome, in the province of that name (Map: Italy, G 5). It is situated on an elevation above the Rio Maggiore. The town is near the site of the ancient Etruscan city of Falerii, and the surrounding ravines contain many interesting relics and remains of that place. There are also ruins of a Roman theatre, and the twelfth-century Abbey of Santa Maria. The Neapolitans, led by Mack, were here defeated by the French under Macdonald, Dec. 4, 1798. Pop., 1901, 5265; 1911, 5383.

CIVITALI, chē'vē-tä'lē, MATTEO (1436–1501). One of the foremost Tuscan sculptors of the early Renaissance; also an architect and engineer. He was born at Lucca, June 5, 1436, of a family identified with the arts. From the style of his sculpture it is evident that he studied in Florence, probably in the workshop of the Rossellini; he was also influenced by Desiderio da Settignano. (See these titles.) Most of his life was passed in or near his native town, where he married, and reared a numerous family. In 1495 he removed to Carrara, the site of the famous marble quarries, to facilitate the execution of commissions for Genoa and Sarzana. He died on a visit to Lucca, Oct. 12, 1501, and lies buried in the church of San Cristoforo. Civitali's art is best represented in the cathedral of Lucca. His principal works there are: the bust of the humanist Pietro di Avenza; the tomb of Pietro da Noceto (1472), a papal secretary, resembling the Florentine monuments, but more severely architectural; two beautiful angels belonging to the former Altar of the Sacrament (1473–76; the shrine itself is in South Kensington Museum, London); the tomb of his friend and patron Domenico Bertini (1479), who also commissioned the chapel of the Volto Santo (c.1481)—a miniature octagon temple, vaulted with a dome and wonderfully decorated; the statue of St. Sebastian; the two-storied altar of St. Regulus (1484–85), with the recumbent image of the martyr, besides six statues and several reliefs; and, lastly, the simple but highly decorative pulpit of the cathedral (1498). Among his other works at Lucca are statues of the Madonna, in the choir of San Michele and Santa Trinità; an "Annunciation" and the "Redeemer" in the Museum, and the tomb of St. Romanus (1490) in the church of that name. The Museo Nationale, Florence, possesses a marble relief of "Faith," the most beautiful representation of the subject in the Renaissance, and another of the Saviour; South Kensington Museum, a relief with a powerful masculine portrait; the Metropolitan Museum of New York, a charming painted terra-cotta "Angel of the Annunciation." The productivity of Civitali's workshop may be judged from the fact that in 1480 he is said to have furnished no less than 22 altars for the cathedral of Pisa, of which interesting fragments remain. His last surviving work is the six statues in the chapel of St. John Baptist in the cathedral of Genoa, in the style of the high Renaissance, and less charming and sincere than his earlier work. As an architect and engineer he constructed a bridge near Lucca and, in 1491–92, the fortifications of his native town.

Civitali is one of the most able and attractive sculptors of the later fifteenth century. He is best classed with the Florentine school, from which he learned his subtle treatment of marble surfaces and acquired decorative skill. But he soon developed an individual style, simple and more rugged than the Florentine. In the expression of sincere religious feeling he is without a peer among the sculptors of his day. His son and pupil NICCOLAO (1482–c.1560) was a sculptor and architect of local importance at Lucca, as was also his grandson VINCENZO (1523–97). Several of his nephews followed their uncle's profession. The best monograph on Civitali is by Yriati, an authoritative work; others are by Roselli (Lucca, 1891), Cappelletti (ib., 1892), and Volpi (ib., 1893).

CIVITAVECCHIA, chē'vē-tä-vĕk'kē-ä (It., old city). A fortified seaport in the Province of Rome, central Italy, situated on the Tyrrhenian Sea, 37 miles northwest of Rome (Map: Italy, F 5). It is the chief port of Rome, and its harbor is protected by two curving moles and a breakwater with a lighthouse. There are extensive dry docks, a magazine, an arsenal built by Bernini, and a citadel constructed from plans by Michelangelo. The fortifications date from the sixteenth and seventeenth centuries. The city has an aqueduct 18 miles long. Civitavecchia is of considerable commercial importance, and has regular steam communication with England and France. It is the seat of a bishop and of a number of foreign consuls, including one from the United States. In the vicinity of the town are situated sulphur springs, with remains of ancient baths. There are manufactories of cement and calcium carbide and the principal imports are coal, cattle, and fire bricks. Civitavecchia is the ancient Centum Cellæ, sometimes called Portus Trajani in honor of Trajan. It was destroyed by the Saracens in 828, but its exiled inhabitants returned in 854, when it received the name of Civitavecchia (old city). It was fortified by Urban VIII, and declared a free port by Innocent XII in 1696. The French held it from 1849 to 1870. Pop., 1901, 17,589; 1911, 17,930.

CIVOLI, chē'vō-lē, LUDOVICO. See CIGOLI, LUDOVICO CARDI DA.

CLAAR, klär, EMIL (1842–). A German stage manager and author. He was born at Lemberg and made his first appearance as an actor at the Burgtheater, Vienna. After holding engagements at Gratz, Brünn, Innsbruck, and at the Court Theatre, Berlin, he successively became stage manager of the Stadttheater, Leipzig (1864–70), and of the Court Theatre, Weimar (1870–71), and was subse-

quently appointed director of the Landestheater, Prague, and the Residenztheater, Berlin (1876–79). From 1879 to 1900 he was associated as director with the two principal theatres of Frankfort-on-the-Main, but afterward he confined himself solely to the management of the Schauspielhaus in that city. Among lyrical poems and dramas written by him are the following: *Gedichte* (1868 and 1885); *Neue Gedichte* (1894); *Welthche Legenden* (1898); *Samson und Delila*, a comedy (1872); *Shelley*, a tragedy (1876); *Die Schwestern*, a melodrama (1892); *Königsleid*, a tragedy (1895).

CLACKMAN'NAN (Gael. Clachan Mannan). The county town of Clackmannanshire, Scotland, on the north bank of the Forth, 9 miles east of Stirling (Map: Scotland, E 3). The neighborhood is rich in coal, iron, and limestone. On a hill above the town is the ruined tower of a castle once belonging to a descendant of the Bruces. Pop., 1901, 2501; 1911, 2203.

CLACKMANNANSHIRE. The smallest county of Scotland, in the East Midland Division, at the head of the Firth of Forth, and bounded by the counties of Perth, Fife, and Stirling (Map: Scotland, E 3). Area, 55 square miles. It is an agricultural and coal-mining county; oats, barley, wheat, and potatoes are the chief crops. The leading towns are Clackmannan, the county town, Alloa, and Dollar. Pop., 1901, 32,000; 1911, 31,121.

CLAD'ODUS. See CLADOSELACHE.

CLADOPH'ORA (Gk. κλάδος, *clados*, sprout + φόρος, *phoros*, one that bears). A genus of green algæ (Chlorophyceæ), belonging to the Confervales. This is one of the most common of the green algæ, being a profusely branching and anchored filamentous form, and occurring in masses in most fresh waters, attached to various kinds of supports. It is particularly interesting because it is a partial cœnocyte (q.v.); that is, it has cross walls and all of its cells are cœnocytic. For this reason it is a transition type between the ordinary Confervales, which are completely septate, and the Siphonales, which are completely cœnocytic.

CLADOPHYLL. See PHYLLOCLAD.

CLADOSELACHE, klăd'ō-sĕl'a-kē (Neo-Lat., from Gk. κλάδος, *klados*, branch + σέλαχος, *selachos*, shark). The most primitive genus of sharklike elasmobranch fishes, found fossil in the concretions of the Lower Carboniferous shales of Ohio and elsewhere. The fish had an elongated, round, tapering body, with a short, blunt head, and eyes situated far in front. The fins, of which there are a pair each of pectoral and pelvic, and two low dorsal, are triangular, with broad bases and without spines, the middle rays of the fins being the longest. The heterocercal tail fin is peculiar in its strongly upturned notochordal axis, with the neural arches continued to the top of the upper lobe; its vertical straight posterior margin and long lower lobe is supported by cartilaginous rays, so that it nearly equals in size the upper lobe. The best-known species are *Cladoselache fyleri*, with a length of 22 inches, and *Cladoselache kepleri*, which attained a length of 6 feet. Both of these are from the Cleveland shale of Ohio. Many of the tricuspid teeth from the Upper Devonian and Carboniferous rocks of Europe and America, described under the generic name of *Cladodus*, seem to be teeth of *Cladoselache*. Consult Dean, "Contributions to the Morphology of Cladoselache (Cladodus)," in *Journal of Morphology*, vol. ix, No. 1 (Boston, 1894). See also ELASMOBRANCHII; SELACHII; SHARK.

CLADRAS'TIS (Neo-Lat., from κλάδος, *klados*, branch + θραυστός, *thraustos*, brittle) (*Cladrastis lutea*). A small leguminous tree, resembling the common locust, having a yellow bark, with cathartic properties. It is variously called yellow wood, yellow ash, yellow locust, and fustic. The tree is native of Kentucky, Tennessee, North Carolina, and adjoining regions, growing in rich soils. It is also common in cultivation.

CLAFLIN, HORACE BRIGHAM (1811–85). An American merchant, born in Milford, Mass. He established himself in business in Worcester, Mass., where, within a few years, he built up one of the largest mercantile establishments in New England. In 1843 he removed to New York, where he established the firm of Bulkley and Claflin, a business which was conducted after the retirement of William Bulkley, in 1851, under the name of Claflin, Mellin and Company. Although the business interests of Mr. Claflin were seriously endangered by his strong anti-slavery attitude, he steadfastly adhered to his opinions, which he did not hesitate to express in public meetings. Upon the outbreak of the Civil War the house was seriously affected, because of its large business in the South. In consequence of Mr. Claflin's integrity and business ability, however, the volume of trade greatly increased during the war, and reached the enormous sum of more than $72,000,000 in 1865. From this time until his death the transactions of the firm probably exceeded those of any other mercantile house in America. Mr. Claflin was noted for his liberality and his numerous charities.

CLAFLIN, JOHN (1850–). An American merchant, born in Brooklyn, N. Y. He graduated from the College of the City of New York in 1869, and in the year following traveled in Europe and in the East. In 1870 he entered his father's firm, H. B. Claflin and Company, one of the largest wholesale dry-goods houses in New York, and in 1873 he became a member of the firm. He organized The H. B. Claflin Company in 1890, and in the years following formed into a combination several of the large retail dry-goods houses in New York as an outlet for his wholesale business, which became the most important of its kind in the United States. He was chosen a trustee of many financial and charitable corporations.

CLAFLIN, WILLIAM (1818–1905). An American merchant and politician, born in Milford, Mass., son of Lee Claflin (1791–1871), a benefactor of Wesleyan College and Boston University. He succeeded his father in a successful wholesale boot and shoe business. He was in the State House of Representatives from 1849 to 1852, State Senator in 1859–60, and President of the Senate in 1861. He became a member of the Republican Executive Committee in 1864, and was its chairman from 1868 until 1872. He was Lieutenant Governor of Massachusetts (1866–68), Governor (1869–71), and a Republican Representative in the Congress in 1877–81.

CLAIBORNE, klā'bôrn, or **CLAYBORNE,** WILLIAM (c.1589–c.1676). An American colonist, prominent in the early history of Virginia and Maryland. He was born in Westmoreland,

England, went to Virginia as surveyor in 1621, and in 1625 was appointed Secretary of State for that Colony. In 1627 and 1628 he explored Chesapeake Bay. He founded a trading post on Kent Island in 1631, which became a flourishing community, and was represented in the General Assembly of Virginia. Afterward the island was included in the grant to George Calvert, first Lord Baltimore, whom Claiborne had bitterly opposed in London. He resorted to arms to maintain his claim, and in 1645 made a descent upon the island, from which, however, he was soon driven. Its possession remained a subject of animated controversy between Maryland and Virginia until 1776. After the execution of Charles I, when Virginia and Maryland had decided in favor of Charles II, Claiborne obtained an appointment on the commission chosen by Cromwell to reduce them to submission (1651). This was soon accomplished; Governor William Berkeley, of Virginia, was removed from office, and Claiborne became Secretary of State of Virginia, under the new Governor, Richard Bennett. In Maryland all Catholics were promptly removed from office—an act which caused considerable friction until 1658, when the province was restored to Lord Baltimore. After the Restoration, in 1660, Claiborne naturally ceased to have influence at court, and about 1676 he died in obscurity. W. H. Carpenter's novel *Claiborne the Rebel* (1845) is based on his career. See Mereness, *Maryland as a Proprietary Province* (New York, 1901).

CLAIBORNE, William Charles Cole (1775–1817). An American politician, first Governor of the State of Louisiana. He was born in Sussex Co., Va.; was educated at William and Mary College; went to New York when he was 15; was employed there in the office of the clerk of Congress; studied law in Richmond, Va.; removed to Tennessee, where he was a protégé of John Sevier; and in 1796 was a member of the State constitutional convention. Though technically ineligible on account of his age, he was elected to succeed Andrew Jackson as a member of Congress in 1797, and served until 1801, when he was appointed to succeed Winthrop Sargent as Governor of Mississippi Territory. In 1803, with Gen. James Wilkinson, he was delegated to accept the transfer of Louisiana to the United States, and in 1804 became first Governor-General of the Territory of Orleans—that part of the Louisiana Purchase lying south of Mississippi Territory and of the thirty-third parallel. His administration of office made him none too popular with the French and Spanish element, but upon the admission of Louisiana, in 1812, he was elected the first Governor of the State, which position he held until 1816. At New Orleans, during the War of 1812, he coöperated with Jackson in repelling the attack of the British. In 1816 he was elected to the United States Senate, but did not live long enough to take his seat.

CLAIBORNE STAGE (from *Claiborne,* in Alabama). A subdivision of the Eocene Tertiary in American geology. The rocks of this stage are found along the Alabama and Tombigbee rivers, in Alabama and in Arkansas. See Tertiary System.

CLAIM (OF. *claim,* demand, from Lat. *clamare,* to call out). A demand of a right; sometimes used of the legal right asserted, as a creditor's claim to be paid the amount due him, sometimes of the amount alleged to be due. In both these senses the term is commonly employed in bankruptcy and other creditors' proceedings against an insolvent debtor, and in the administration of the estates of deceased persons. In all such cases the claim must be proved—i.e., verified by oath—in order to share in the distribution of the assets; the duty of the trustee in the former case, and of the executor or administrator in the latter, being limited to the payment of duly authenticated claims against the estate.

At the common law, a claim was a formal assertion of title to, or of interest in, property, real or personal, which was in the possession of another. It was not a mere protest against an unlawful seisin or detainer of property, but was a recognized process for preserving the rights of the claimant against extinction by reason of lapse of time or other cause. It had, therefore, much of the effect of an actual entry upon land, and was available to one who, by reason of his interest being a future and not a present one (as a remainder or reversion), was not entitled to make an immediate entry; or, as Coke explains, "when a person dares not make an entry on land for fear of being beaten or other injury, he may approach as near as he can to the land and claim the same, and that shall be sufficient to vest the seisin in him." In other cases, however, in which the claimant's right depended on possession, it seems to have been considered that, to make a claim to an estate effective, there must be an actual entry into some part of the lands claimed.

Continual claim was the process whereby one who had been disseised of lands prevented his claim from lapsing by reason of the death of his disseisor and the transmission of the lands to the latter's heir by descent. In order to avoid this consequence, it was necessary to make claim within a year and a day of the disseisor's death, and to insure this to repeat the formality *continually* within that interval until the descent took place. See Adverse Possession; Disseisin.

In the United States the term "claim" has acquired a distinctive sense as applied to the initial or prima-facie title acquired by settlers to government lands, and by prospectors to mineral lands, under United States statutes. The term is also applied to the land so secured. These claims may, upon the performance of the terms of sale, ripen into complete and valid titles; but, in the meantime, they confer on the claimant or holder a recognized though defeasible property right, which may be bought and sold and administered upon, like any other property. Because of its precarious nature, it is generally considered personal rather than real property. See Government Lands; Preemption.

In admiralty proceedings the statement of rights of the defendant or other party to property attached under process of the court is called the "claim."

Statement of claim is the pleading in which the plaintiff sets forth the facts constituting his cause of action. It supersedes the declaration in England, and corresponds to the complaint in the code practice of most of the United States. The facts are alleged in it in a plain, concise, and natural way, avoiding the arbitrary forms that characterized the declaration in common-law pleading. The phrase is used

in some jurisdictions to designate any narrative of facts that is made the basis of a judicial of official proceeding. See DECLARATION; PLEADING.

Claim of liberty, in English law, is a petition to the sovereign, filed in the Court of Exchequer, claiming a privilege or immunity, as freedom from jury duty, by virtue of custom or the petitioner's rank. The claim was made under an actual or supposed grant, as these "liberties or franchises" (q.v.) were said to have originally been a part of the crown's prerogative, which could only be enjoyed by a subject by virtue of a grant from the sovereign.

CLAIMS, COURT OF. In the United States, a tribunal created by act of Congress, or by the Legislature of a State, to entertain and adjudicate claims against the general government or against the State so authorizing them. A State, being sovereign, can of course not be sued, or subjected to legal process. It is perfectly obvious that, under ordinary circumstances, the tribunals that are instituted by the sovereign power for the adjudication of controversies and the punishment of offenses against itself cannot be employed, either by a citizen or by another sovereignty, to enforce claims against such power. Indeed, in the legal sense of the term, there can be no such thing as a "claim" against a sovereign State. In recent times, however, it has become customary for governments voluntarily to submit alleged claims of a civil nature —such, i.e., as involve a demand for a money compensation—to tribunals of limited powers for consideration and determination. Where the controversies are international, the tribunal may be a board or commission of arbitration. Where the claim is that of an individual citizen, the State may either authorize the ordinary tribunals to hear and determine the question at issue, or may create separate tribunals for that purpose. The latter method is the one that has been generally adopted in the United States, both by the Federal government and the several States. The tribunal so created is variously termed a "court of claims" or a "board of claims." It must be borne in mind, however, that the State does not abdicate its sovereign authority to these courts, and that no process lies for enforcing their decrees. The judgments of a court of claims are in the nature of recommendations only, certifying that the adjudicated claim is, or is not, under the rules established by the statute, a valid and proper claim. If the judgment is in favor of the claimant and against the State, the payment thereof is, like the payment of an award made in an international arbitration, a voluntary act. Under the American system, such payment calls for an appropriation by Congress or the Legislature of the State affected by the decision.

The Court of Claims of the United States (which has served as a model for those of the several States) was created by Act of Congress, Feb. 24, 1855, and consisted originally of three judges appointed by the President and Senate, to hold office during good behavior, and to have jurisdiction to hear and determine all claims founded on any act of Congress, or on any regulation of any executive department, or on any contract, express or implied, with the government of the United States; and all claims which might be referred to it by either House of Congress. The government was to be represented before it by a solicitor and assistant solicitor appointed by the President; and the compensation of all members of the court was fixed by law. By the Act of March 3, 1863, two additional judges were to be appointed by the President, and a chief justice from the whole number of judges (five). By this act the court was also authorized to take jurisdiction of all set-offs, counterclaims, claims for damages, liquidated or unliquidated, or other demands whatsoever on the part of the government against any person making claim against the government in said court. If the judgment of the court be in favor of the government, it shall be filed in the office of the clerk of the proper district or circuit court of the United States, and shall ipso facto become and be a judgment of such district or circuit court, and shall be enforced the same as other judgments. If the judgment be in favor of the claimant, it is provided that the sum thereby found due to the claimant shall be paid out of any general appropriation made by law for the payment of private claims, on presentation to the Secretary of the Treasury of a duly certified copy of such judgment. In cases where the amount in controversy exceeds $3000, an appeal may be taken to the Supreme Court of the United States at any time within 90 days after judgment. Where the judgment or decree may affect a constitutional question, or furnish a precedent affecting a class of cases, the United States may take an appeal without regard to the amount in controversy. Claims must be filed within six years after the claim accrues, except in cases of disability. The court is required to hold one session annually, commencing on the first Monday in October.

The jurisdiction of the court is not to extend to any claim growing out of any treaty with foreign nations or Indian tribes, unless such claim was pending in said court Dec. 1, 1862; nor shall the jurisdiction of the court extend to any claim against the United States for the destruction, appropriation, or damage of any property by the army or navy engaged in the suppression of the Civil War, from the commencement to the close thereof. The general principle characterizing all the legislation relating to this court is that its jurisdiction is confined to claims arising out of contract or for damages in cases not sounding in tort. Accordingly, the Supreme Court of the United States has held that a person injured by the tort—that is, by the wrongful act—of a government officer or agent, cannot obtain redress in the Court of Claims, but must apply to Congress for relief. It has also been held, by the same court, that in order to obtain a recovery upon an implied contract, the claimant must show that the United States received a consideration for the claim presented, or that they received money or property with a duty to turn it over to the claimant, or that the claimant had a lawful right to it when the United States received and appropriated it. The statutes provided that claims of the character above described may be recovered whether or not they are such as would be prosecuted in a court of law, of equity, or of admiralty if the United States were suable; but the actions in this court are not actions at common law, and therefore the claimant has no right to a jury trial; nor does this court possess the jurisdiction and powers of an equity tribunal. The court has declared that it has never felt itself bound

by the strict rules of common law or of equity pleading and practice, but that its aim is to administer justice between the claimant and the government in a simple and expeditious manner. Proceedings originate in the court by petition filed; and testimony used in the hearing and determination of claims is taken by commissioners who are appointed for the purpose by the court. Consult, for full information, the United States statutes and the digests. For the organization and jurisdiction of similar tribunals constituted by them, the statutes of the several States must be consulted.

CLAIRAC, klâ'răk'. A town in the Department of Lot-et-Garonne, France, situated in a fertile country on the Lot, 16 miles northwest of Agen. It has a large trade in white wines. Clairac was built about an abbey in the eighth century. It was the first place in the south of France which, in 1527, embraced the doctrines of the Reformation. It was the scene of frequent contests between Roman Catholics and Huguenots. Théophile Viaud, the French poet, was born here in 1626. Pop. (commune), 1891, 3562; 1901, 2880; 1911, 2824.

CLAIRAUT, klâ'rô', Alexis Claude (1713–65). A prominent French mathematician, physicist, and astronomer, born in Paris. He showed a precocity analogous to that of Pascal. At the age of 10 he read l'Hôpital's works on infinitesimal analysis and conic sections; before he was 13 he presented a memoir on curves to the French Academy of Sciences; at 16 he published his first work, on curves of double curvature, and at 18 he was elected a member of the Academy. In 1736 he was appointed to accompany Maupertuis on an expedition to Lapland, for the purpose of measuring a degree of the meridian—a work which proved, contrary to the opinion of Cassini, the flattening of the earth towards the poles. Shortly after his return, in 1743, appeared his *Théorie de la figure de la terre*, based on Newton's law of gravitation, and on Maclaurin's results concerning homogeneous ellipsoids. In the field of mathematics Clairaut studied curves of the third order, tortuous curves, and projections, and was the first to find the *singular* solution of a differential equation of the first degree in x and y. The equation used by Clairaut, often called Clairaut's form, is $y = px + f(p)$, in which $p = \frac{dy}{dx}$. In physics he first showed the necessity of considering the attraction between the parts of the fluid itself, in order to explain the phenomenon of capillary action; computed the change in gravity at high latitudes, and so fully demonstrated the figure of the earth that little essentially new has since been added. At least, according to Todhunter, "The splendid analysis which Laplace supplied, adorned but did not really alter the theory which started from the creative hands of Clairaut." In the field of astronomy he solved the famous problem of three bodies in the case of the sun, earth, and moon; explained the motion of the lunar apsides, and constructed lunar tables, later supplanted by those of Mayer. Clairaut also predicted the return of Halley's comet for about April 15, 1759; although the degree of accuracy was remarkable for the time, and the approximation closer than Halley's, it failed by a month, and subjected its author to the ridicule of his rival, D'Alembert. During his last years fondness for society and desire for luxury hindered his scientific work. His leading works (published in Paris) are: *Recherches sur les courbes à double courbure* (1731); *Traité de la figure de la terre* (1743 and 1808); *Théorie de la lune* (1752 and 1765); *Eléments de géométrie* (1741 and 1765); *Eléments d'algèbre* (1746 and 1760); and *Théorie du mouvement des comètes* (1760).

CLAIRFAIT, Charles D. See Clerfayt.

CLAIRIN, klâ'răN', Jules Georges Victor (1843–). A French painter and illustrator. He was born in Paris, studied with Picot and Pils, and afterward traveled in Spain and Morocco with Henri Regnault, a journey which strongly influenced his choice of subjects. Like Regnault, he may be classed as one of the last Romanticists. (See Painting, *History.*) His paintings are fine in color, effective in composition, and have always aroused wide interest. Among them are: "The Benediction of the Swords," "Allah! Allah!," "The two Hostile Tribes," "After the Victory," "The Massacre of the Abencerrages" (Rouen), "A Moorish Sentinel" (Metropolitan Museum, New York), "Entering the Harem" (Walters Gallery, Baltimore). His portraits include those of Mounet-Sully as Hamlet (1889), Sarah Bernhardt, and Madame Krauss. He also executed a number of effective decorative paintings in the Paris Opera, the Bourse, and in the Salle-des-jeux at Monte Carlo.

CLAIRON, klâ'rôN', Mlle. (1723–1803). A French actress, commonly known as "La Clairon," whose real name was Claire Josèphe Hippolyte Léris. She was born near Condé, in Flanders, and had played for several years at Rouen, Lille, and elsewhere before she appeared at the Paris Opéra, and a little later, in September, 1743, made her first appearance at the Théâtre Français. This was in *Phèdre.* Her success was immediate and brilliant, and she became the rival of Mlle. Dumesnil, then at the height of her popularity. Mlle. Clairon was of small stature, but with a beauty which was both vivacious and dignified, and she was gifted with a remarkable voice. She and her colleague Lekain were known as innovators, for endeavoring to bring about a more rational mode of costuming than was at that time conventional upon the stage. Some of her greatest achievements were in the *Zelmire* and *Le siège de Calais* of Belloy, and in the tragedies of Voltaire, *Zulime, Sémiramis, Olympie, Tancrède, Oreste,* and *L'Orphelin de la Chine.*

In 1765, as the result of a scandal of which she was a victim, she abandoned the stage. For a number of years she resided at the court of Ansbach. The *Mémoires d'Hippolyte Clairon et réflexions sur la déclamation théâtrale,* which she wrote in old age, were published in Paris in 1799. The book gives many interesting details concerning her art and is full of lively anecdotes.

CLAIRVAUX, klâr'vô' (from Lat. *clara vallis,* fair vale; from *clarus,* clear, and *vallis,* valley). A village in the Department of Aube, France, about 10 miles southeast of Bar-sur-Aube, on the left bank of the river Aube (Map: France, N., K 4). It is the site of the famous Cistercian abbey (*Clara Vallis*) founded in 1115 by St. Bernard, who presided over it until his death, in 1153. His body still lies in the church. The abbey was raised to a central prison during the French Revolution and at one time

held nearly 1500 prisoners. The extensive buildings are still used as a penitentiary. See Arbois de Judainville, *Etudes sur l'état intérieur des abbayes cisterciennes et principalement de Clairvaux*. The chief industries are lumbering in the neighboring forests and agriculture.

CLAIRVILLE, klâr'vēl', Louis François (1811–79). A French dramatic author, whose real name was Nicolaie. He was born Jan. 28, 1811, in Lyons, but went early to Paris, and in youth had a varied practical experience with theatrical life. About 1837 he began his long series of dramatic productions, which he wrote generally in collaboration with other playwrights. Some of the more noted are the comedies *La propriété, c'est le vol* (1848), *Les tentations d'Antoinette* (1850), *Quinze heures de fiacre* (1867), and the librettos to the operas *Daphnis et Chloè*, by Offenbach (1849), and *La fille de Madame Angot*, by Lecocq (1873).

CLAIRVOY'ANCE (Fr. *clairvoyant*, clear-seeing, from *clair*, Lat. *clarus*, clear + *voir*, Lat. *videre*, to see). An alleged ability to see, in a trance state, objects and occurrences which are not discernible in the normal state. Belief in the clairvoyance of the hypnotic trance is as old as history. Socrates, Apollonius, Cicero, Pliny, Tertullian, all furnish records of the prophetic dreams and utterances of clairvoyants. In later times the visions of Swedenborg and Davis have become widely known.

Of the existence of the somnambulistic state of hypnosis, in which clairvoyance is said to occur most often, there can be no doubt. Suggestion (q.v.), whether it be from without (the words, passes, or other artifices of an operator), or from within (autosuggestion, q.v.), suffices in most people to induce this state. Certain other conditions (fasting, drugs, disease, general emotional excitability) may induce an apparently spontaneous and indeterminate appearance of somnambulism. Every one is familiar with the epidemic catalepsy of the religious revival, best exhibited, perhaps, by the negroes of the South.

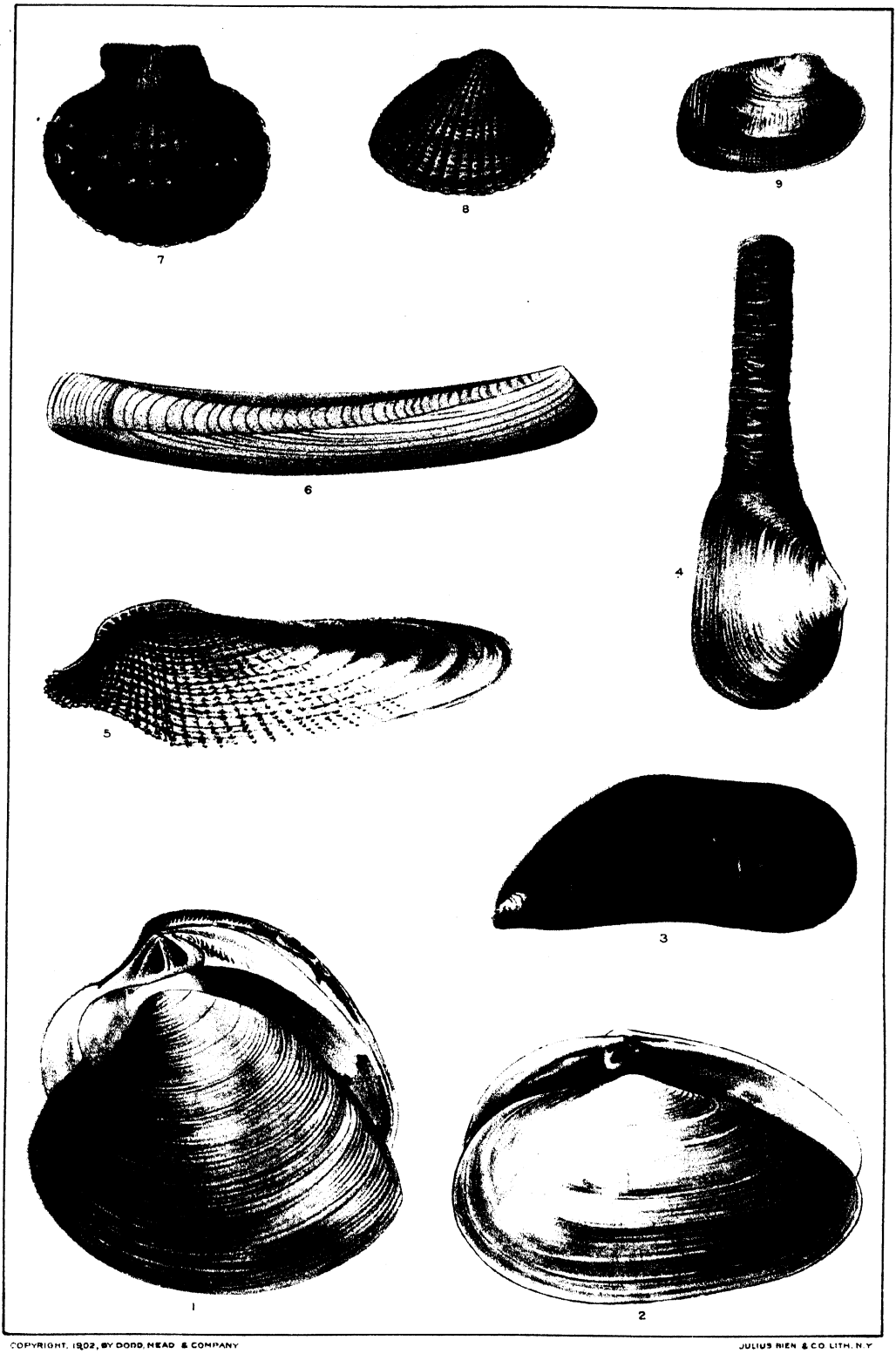
As to the existence of clairvoyance in somnambulism, opinions are divided. Some, with Tuttle, consider clairvoyance "an inherent faculty, a foregleam in this life of the next spiritual life." They esteem the clairvoyant as a peculiarly sensitive person, whose mind is, for the time being, directed by some departed spirit, and whose lips speak with an intelligence not his own. Others consider that the clairvoyant is able, without such direction, to see objects and occurrences beyond the ken of normal vision. Still others take a middle ground, and consider that the results are to be explained by telepathic communication, not between departed spirits and the medium, but between the minds of one or more living persons and that of the 'percipient' (*télépathie-à-trois*). Finally, many deny the presence of supernormal agencies; indeed, scientific psychology has neither found satisfactory evidence of such agencies, nor has it been able to accept the evidence adduced by the votaries of "psychical research." Consult: Flournoy, *From India to the Planet Mars* (New York, 1900); Podmore, *Apparitions and Thought Transference* (London, 1895); Hyslop, *Enigmas of Psychical Research* (Boston, 1906).

CLAKAMA, klâ-kä'mâ, **CLOCKAMA,** klô-kä'mâ, or **KLOKAMA.** An Indian tribe of the Chinookan stock. See Chinook.

CLAL'LAM, Skalam, or Nusklala. A Salishan tribe, formerly of considerable importance, occupying the greater part of the coast extending west from Puget Sound, in Clallam Co., Wash. They still number 398, attached to the Puyallup Agency.

CLAM (older form also *clamp*, from the firm clamp of the shell, AS. *clam*, bond, OHG. *clamma*, narrow pass; cf. also Dutch *klamp*, cleat). The popular name of many widely various bivalve mollusks, especially those good to eat. In the United States it commonly designates either the quahog (*Venus mercenaria*), distinguished as the hard or round clam, or else the manninose (*Mya arenaria*), called long or soft clam. The former is a heavy, globose shell, allied to the cockles, which plows its way along sandy bottoms, standing erect upon its thin edge, and is obtained wholly by raking, in water from 10 to 40 feet in depth. It abounds from Cope Cod to Florida, and also near Shediac, New Brunswick, and is the common "clam" of New York markets, where small ones (young) are much esteemed under the name of "little necks," according to some authorities after Little Neck, Long Island. In Boston and New England the Indian name "quahog" attaches to this, and "clam" usually means the *Mya*, called "soft clams" elsewhere. These are of a very different character, having comparatively thin, smooth, elongated shells, a protrusile, bladelike foot, adapted to digging, and siphons that may be longer than the shell. They remain sunken in the sand of the shore, between tide marks, their siphon mouths just at the surface, and when disturbed they eject a spurt of water as they withdraw to safer depths. These clams are obtained by digging at low tide; and they are cultivated by the protection of certain favorable areas of seabeach, where they soon lie almost as thick as paving stones. Formerly enormous quantities of both these clams, with razor clams, etc., were gathered and salted in New England as bait for the cod fisheries, but this demand has diminished. Great Britain has the "gaper," a closely allied species, but it is not so popular. On the New England coast two other large mollusks of deep water are eaten when obtainable, under the name of beach, sea, or surf clams—especially *Spisula solidissima*. The Southern States have a large edible species, also, in the painted clam (*Callista gigantea*). On the Pacific coast—to which Eastern clams have been transplanted with some success, and are constantly sent, refrigerated, for immediate consumption—several edible bivalves are used, for some of which the term has been borrowed. Thus, the California "flat clam" is a species of Semele, and others are of the genera *Tapes*, *Saxidomus*, and *Glycymeris*. The "geoduck," gathered for food by the Indians of the Northwest coast, is *Glycymeris generosa*. The shells of most of these were formerly used by the natives in manufacturing the various beads and shell ornaments which passed as money among them. (See Shell Money.) Inland, the word "clam" refers to some of the many fresh-water mussels. (See Mussel.) The "giant" clam of the East Indies (*Tridacna gigas*) is the greatest of living mollusca, its soft part amounting to 20 pounds of edible flesh, while the deeply hollowed shells may weigh 500 pounds. "In some churches of France they are employed to hold the holy water—a use which well accords with the beautiful white of the inner surface of the shell. . . . In many of the islands, stones

CLAMS AND EDIBLE MUSSELS



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1 AMERICAN HARD CLAM OR QUAHOG - (VENUS MERCENARIA)
2 AMERICAN SOFT OR LONG CLAM - (MYA ARENARIA) SEE FIG. 4
3 EDIBLE MUSSEL - (MYTILUS EDULIS)
5 PIDDOCK OR DATE-FISH - (PHOLAS DACTYLUS)
6 RAZOR-CLAM, - (SOLEN ENSIS)
7 SCALLOP - (PECTEN IRRADIANS)

are unknown; but, as a substitute, the natives make their knives and axes from the fragments of this shell." See Colored Plate of CLAMS AND EDIBLE MUSSELS.

Fossil Forms. The genus *Mya* ("soft" or "long" clam) appeared in Tertiary time, with species that show little difference from those now living. So with the genus *Mactra*. The family Veneridæ, to which the little-neck clam (*Venus mercenaria*) belongs, is an old one; it began in the Middle Jurassic, with small species of rounded form, which can often with difficulty be distinguished from the accompanying species of Cyprinidæ. The genera *Tapes*, *Cytherea*, and *Cyprimeria* are abundant in Cretaceous rocks, *Cytherea* in the Eocene, and *Venus* in the Miocene. Shells of several species of Venus are extremely common, and finely preserved in the Miocene sands and marls of some localities in Virginia and southern Europe. For American clams of all sorts, consult: Goode, *Fishery Industries*, sec. i. (Washington, 1884); Lovell, *Edible Mollusks of Great Britain*, etc. (London, 1884). For fossil forms, see TERTIARY; MIOCENE.

CLAM. In heraldry, a term for an escalop or cockleshell. It is supposed to indicate that the bearer has been a crusader or has made long voyages by sea. See HERALDRY.

CLAMART, klä'märʹ. A town in the Department of Seine, France, 4½ miles southwest of Paris at the foot of the Chatillon plateau (Map: Paris). It is a favorite residential suburb of Parisians, and is the seat of the Hospice Ferrari, an asylum for aged men. The Bois de Clamart, which is part of the Bois de Meudon, is a popular picnic resort of the Parisian bourgeoisie. It has an old Gothic church. Pop. (commune), 1901, 7391; 1911, 11,376.

CLAM CRACKER. A sting ray. See RAY.

CLAMECY, klä'me-sêʹ. The capital of an arrondissement in the Department of Nièvre, France, at the confluence of the Yonne and the Beuvron, 46 miles northeast of Nevers (Map: France, N., J 5). It is also situated on the Canal du Nivernais. Its parish church of St. Martin, surmounted by a fine square tower, has interesting architectural features of the thirteenth, fifteenth, and sixteenth centuries. The twelfth-century church of Bethlehem is now the annex of a hotel. The modern Château of Vauvert is a handsome building in fine grounds. There are manufactures of cloth, paper, leather, pottery, boots, shoes, and chemicals, and a considerable timber trade by river with Paris; a thriving trade also flourishes in cattle and wine. A bronze bust, by Angers, of Jean Rouvet, the native who in 1549 invented the wood raft for supplying Paris with timber, stands on a bridge spanning the river. Pop. (commune), 1901, 5426; 1911, 4869.

CLAM-GALLAS, kläm'gäl'läs. EDUARD, COUNT (1805–91). An Austrian general, born at Prague. He entered the army in 1823, and became a major general at the age of 44. In 1848 he served with distinction in the Italian and Hungarian campaigns and in the latter commanded the Transylvanian corps which effected the union with the Russians, and thus led to the defeat of General Bem at Sepsi-Saint György and Kaszon-Ujfalu. In 1850 he was placed at the head of the First Division of Bohemian Regulars, and in 1859 fought with distinction at Magenta and Solferino, but during the disastrous campaign of 1866 he was defeated by the Prussians at Hühnerwasser, Podol, Münchengrätz, and Gitschin; was relieved of his command and brought before a military tribunal, by which, however, he was acquitted. While he was known to have committed strategical errors, the chief responsibility for the disasters was probably traceable to his superior officers.

CLAMPING SCREW. A tool used by carpenters and joiners for holding work on a table, or for securing two or more pieces together. Two sorts are generally found: One consists of two straight bars of wood or metal, to which are fitted two screws parallel to each other and at right angles to the bars. The one screw passes through both bars and is threaded in the second one, with an abutting shoulder which bears on the outside of the first. This adjusts the distance between the bars to the thickness of the work to be clamped. The second screw is threaded in the second bar, but its end abuts against the outer end of the first. When it is tightened to refusal, a powerful combination of lever and screw forces the opposite ends of the bars to grip with great power. The second type is a device shaped like the letter G, through the upper end of which the screw passes, and holds between its point and the lower end the portions to be clamped, generally for gluing together.

CLAN (Gael. *clann*, Ir. *clann*, *cland*, offspring, tribe, Welsh *plant*, offspring, children, Lat. *planta*, connected with Skt. *kula*, Lith. *kiltis*, family). A collection of families united under a chieftain, all claiming descent from a common stock, and possessed of a common surname. The word "clan" has been adopted as the ethnological generic term. Synonyms and parallels have been sought in the Arabic *hayy*, the Greek *γένος*, *genos*, the Roman *gens*, the Russian *mir*, the German *Gemeinde*, the Swiss *almend*, the Irish *sept*, and the North American *otem* (totem). It is now well established, however, that in the primitive Indo-European organization of society several families, presumably kindred, united in a brotherhood (Greek *φρατρία*, *phratria;* South Slavonic *bratstvo;* Latin *curia*, house); several brotherhoods in a tribe (Greek *φυλή*, *phylē*, South Slavonic *pleme*, Latin *tribus*); and finally several tribes in a folk, or nation (Greek *ἔθνος*, *ethnos*, Latin *populus*). Higher than the folk were loose federations merely of nations—*Volker*, or *populi*. From this scheme it is clear that the primitive "clan" is to be identified with the brotherhood rather than with the *γένος*, *genos*, or gens. In fact, the Greek *γένος* is post-Homeric, and therefore comparatively late; doubtless it became politically important with the rise of the aristocracy. The typical Greek *γένος* was but a powerful family under a single leader; most probably in early Attica the chief of every noble *γένος* had a seat in the great aristocratic council (of the Areopagus). But some Attic *γένη*, *genē*, were mere guilds of coppersmiths, of heralds, etc. The typical Latin *gens* likewise developed from the family, as is indicated by the derivation of the gentile name from the personal name, and was also a comparatively late institution. Probably every patrician *gens* was once represented by its chief in the Senate. Whereas the *γένος* and *gens* are thus seen to have been monarchial, the *φρατρία*, *phratria*, and the *curiæ* were aristocratic; the nobles held the offices and priesthoods, and doubtless controlled the votes of the commons,

many of whom were clients. In all essentials the *bratstvo* resembles the *gens* (*γένος, genos*) of the Greeks and Romans. The general principles of clanship were common rights and duties, with obligations to avenge one another's wrongs. The members were bound together, not only by the sentiment of common origin and blood, but also by the common worship of a protecting deity, from whom all claimed descent. After the introduction of Christianity among the Southern Slavs, a patron saint took the place of the ancestral deity, who is still celebrated in song, though shorn of his divine qualities. Much confusion has arisen from identifying the clan with the village. The basis of the clan, tribe, and folk is kinship, real, or assumed; the basis of the village, *pagus*, and *civitas* is in some degree territorial—the idea of neighbor partly supplanting that of kin. In simpler words, all the villagers were not even presumably kinsmen. Thus the village was the first step in the development of political society from tribal life. No theory of exogamy, metronymy, or of patriarchal government will apply to all clans; there are indications of a great variety of primitive usage. Apart from the Southern Slavs and from sections of India, the Indo-European clan has continued most vital among the Celts, especially in the Highlands of Scotland. The feuds of the clans and the struggle between these autonomous societies, on the one hand, and the central government on the other, made up a large part of the history of Scotland to the suppression of the Rebellion of 1745, after which the British Parliament enacted laws for the abolition of the hereditary jurisdiction of the Scottish chieftains, and for the disarming of the clans. The influence of the system still lingers, however, in remote and sparsely populated districts.

Bibliography. Fustel de Coulanges, *The Ancient City* (Eng. trans., Boston, 1889); Maine, *Early Law and Custom* (New York, 1883); Zimmer, *Altindisches Leben* (Berlin, 1879); Mayne, *Hindu Law and Usage* (London, 1883); Morgan, *Ancient Society* (New York, 1878); Leist, *Graco-italische Rechtsgeschichte* (Jena, 1884), and *Altarisches Jus Gentium* (Jena, 1889); Schrader, *Sprachvergleichung und Urgeschichte* (Jena, 1890)—very valuable; Meyer, *Geschichte des Altertums*, vol. ii (Stuttgart, 1893). For the true relation of the Greek and Roman *gens* to the other groups, consult: Krauss, *Sitte und Brauch der Sudslawen* (Vienna, 1885); Seebohm, *Tribal System in Wales* (London, 1895); Skene, *Celtic Scotland* (3 vols., Edinburgh, 1876–80); Lang, *The Secret of the Totem* (London, 1905); also, *The World of Homer* by the same author (London, 1910); Bradley, *Malta and the Mediterranean Race* (London, 1912). For the relation of the clan to existing political institutions, see also TRIBE; SOCIOLOGY.

CLANDESTINE MARRIAGE, THE. A comedy by Colman and Garrick (1766), worked over from the Rev. James Townley's farce *The False Concord*.

CLANG TINT, EXPLANATION OF. No one who is at all familiar with music has any difficulty in naming the instrument or class of instruments from which a given tone proceeds. "The same note" may be sounded, e.g., on piano, organ, violin, and harp. We recognize it as "the same" in every case; and yet it "sounds different," so that we can say, "This is the note of a pipe, this of a struck, or bowed, or plucked string." The criterion of difference, in such cases, is termed clang tint, or clang color, or timbre. The note of a musical instrument is not a pure tone (see AUDITION), but a mixture of tones. Strongest of the "partial" tones is the fundamental, the lowest constituent tone; this dominates and gives name to the whole tonal mass, so that the a^1 of the above-named instruments is named a^1 and sounds as a^1 in virtue of its fundamental—a pure tone of (say) 440 vibrations in the one second. Besides the fundamental, the note contains a number of higher partials or overtones. If we represent the pitch number of the fundamental by 1, then the pitch numbers of the overtones stand to it in the ratios 2, 3, 4, etc.; hence a perfect musical note would contain the vibration ratios 1: 2: 3: 4: 5: 6: 7 . . . , the overtones decreasing in intensity with their height, until they finally became inaudible. The primary reason that differences of clang tint obtain is that the various musical instruments favor certain overtones, and suppress others (Helmholtz); in some cases, e.g., the resonance chamber of the instrument reënforces only the odd-numbered partials, 3, 5, etc. (clarinet); in others, a particular overtone is killed by the striking of a string at a certain fraction of its length (in most modern pianos, the sixth overtone or seventh partial is thus suppressed); in others, again, the low overtones are weak and the high are strong (bassoon, harmonium). A practiced ear is sensible of these differences as such, and can analyze the note into its tonal components. For most hearers, however, the differences exist merely as differences in the "coloring" of the fundamental.

There are two further constituents of clang tint: 1. Different musical tones are accompanied by characteristic noises in wind instruments, by the rush or hiss of the air; in string instruments, by a scrape or thud or pluck. 2. Different musical tones begin and end in characteristic ways; the clangs of the zither are dry and short, those of the organ full and sustained; the oboe is flexible, the bombardon or bass tuba lumbers into the orchestral complex, etc. Finally, there are many secondary criteria for the recognition of musical tones: the range within which the fundamental falls, the intensity of the clang, the peculiar melodic task set to a sequence of tones, etc.

Clang Tint of Vowels. It was formerly believed that the vowel sounds of the human voice owe their clang tint to a regular series of overtones, and that vowel qualities differ from the tones of musical instruments in that the loudness of their overtones depends not solely upon numerical order, but principally upon absolute pitch. At the present time the evidence of experiments is against this view, and the following new theories have been proposed. 1. The vowel sounds owe their timbre to certain concomitant tones whose pitch remains relatively constant whatever the fundamental may be upon which the vowel is spoken or sung. These tones are called "formants"; they apparently represent the proper tones of the buccal resonance chambers; they are usually inharmonic both to the fundamental and to one another; and they may attain to a high degree of intensity. 2. Pure tones, without partials or formants, have in themselves vowel qualities. For example, low tones immediately suggest the sound of *oo* as in *moon;* if we ascend the scale, the *oo* gradually becomes more like *o* as in *hole*, until a tone is

reached that seems to be a pure *o;* if we continue up the scale, we find other tones which are like *a* as in *father*, then *e* as in *prey*, and finally *i* as in *machine*. 3. Finally, it is held that vowels are not tones at all; that, on the contrary, they are modes of noise; and that, if we attempt to classify them, we must regard them as qualities of noise.

Consult: Helmholtz, *Sensation of Tone* (Eng. trans., London, 1895); Stumpf, *Tonpsychologie* (Leipzig, 1890); Titchener, *Experimental Psychology* (New York, 1901); See INSTRUMENTATION.

CLAN-NA-GAEL. An Irish secret society, founded by fanatical Irishmen in the United States, for the purpose of intimidating the British government by violence and forcing compliance with Irish demands for home rule. It was responsible for the dynamite outrages of 1883 in London.

CLA'OSAU'RUS. See THESPESIUS.

CLAP, ROGER (1609–91). An English colonist in America; one of the founders of Dorchester, Mass. He was born in Salcomb, Devonshire, England; emigrated to New England, where he became one of the first settlers in Dorchester, in 1630, and was captain of the fort or "castle" on Castle Island from 1665 to 1686, after which, until his death, he lived in Boston. He is best remembered for his *Memoirs*, which he prepared about 1676, but which were not published until 1731, when they were edited by Thomas Prince. Six subsequent editions were published, the last appearing in 1844, as vol. i of the *Collections of the Dorchester Antiquarian and Historical Society*. The book is of slight historical value.

CLAP, THOMAS (1703–67). An American Congregational clergyman. He was born at Scituate, Mass., June 26, 1703; graduated at Harvard, 1722; was minister at Windham, Conn., from 1726 to 1740; president of Yale College from 1740 to 1766, rendering valuable service to the institution. Through his efforts, a college building and chapel were erected. His resignation was the result of his opposition to the revival movement headed by Jonathan Edwards and George Whitefield. His ingenuity and scientific attainments are attested by his construction of the first orrery or planetarium used in America. He published sermons, letters, and tracts; *Religious Constitution of Colleges, Especially of Yale College* (1754); *History and Vindication of the Doctrines Received and Established in the Chronicles of New England* (1755); and *Annals or History of Yale College* (1766). He died in New Haven, Conn., Jan. 7, 1767.

CLAPHAM, klăp'*am*. A Parliamentary district of London (q.v.), England, 4½ miles southwest of St. Paul's Cathedral (Map: London, F 6). It is noted as one of the busiest railway centres in the world.

CLAPP, CORNELIA MARIA (1849–). An American zoölogist, born at Montague, Mass. She was educated at Mount Holyoke College, Syracuse University, and the University of Chicago, and in 1896 became professor of zoölogy at Mount Holyoke. During the summers of 1888–1902 she carried on investigations at the marine biological laboratory at Woods Hole, Mass. Her writings comprise articles on biology and morphology in technical journals.

CLAPP, MOSES EDWIN (1851–). An American legislator, born in Delphi, Ind. He graduated from the Wisconsin Law School in 1873, was county attorney of St. Croix Co., Wis., in 1878–80, and attorney-general of Minnesota in 1887, 1889, and 1891. He then removed to St. Paul. In 1901 he was elected to the United States Senate to fill a vacancy, and was reëlected in 1905, and again in 1911 for the term ending 1917. Senator Clapp identified himself with the progressive wing of the Republican party, and strongly supported the candidacy of Theodore Roosevelt for President in 1912. In the Sixty-third Congress he was chairman of the Committee on Standards, Weights, and Measures, and was a member besides of various important committees.

CLAPPER RAIL, or MUD HEN. See RAIL.

CLAP'PERTON, HUGH (1788–1827). A British explorer of Africa, born at Annan, Dumfriesshire, Scotland. He went to sea at 13, was impressed in the navy, served in the East Indies and on the Great Lakes (in the War of 1812 and immediately afterward), and returned to England as lieutenant in 1817. In 1822, with Oudney and Denham, he set out from the Mediterranean to explore the interior of Africa. The expedition was the first from Europe to reach Lake Chad (1823). Thence Clapperton and Oudney struck westward to find the source of the Niger; but on the way Oudney died (1824), and Clapperton was detained at Sokoto by the Sultan. He returned to England in 1825, was promoted to be commander, and was placed in charge of a second expedition for the exploration of the Niger. He set out from the coast of the Gulf of Guinea, his party this time consisting of Richard Lander (q.v.), who published an account of his chief's experiences, and three others, who died soon after leaving the Bight of Benin. Crossing the Niger to Bussang, the two survivors reached Sokoto, where Clapperton was detained for the second time, on account of civil war, and, worn out by hardships and failure, succumbed to disease. For his explorations, consult *Narrative of Travels and Discoveries in Northern and Central Africa, in the Years 1822, 1823, and 1824, by Major Denham, Captain Clapperton and the Late Dr. Oudney* (London, 1826), and Lander, *Records of Captain Clapperton's Last Expedition to Africa* (London, 1830).

CLAQUE, klăk (Fr., handclapping). A body of persons, individually known as "claquers," engaged to promote the success of a public performance by bestowing upon it preconcerted applause, and thus giving the public a false notion of the impression it has made. In principle, the claque has existed from time immemorial, since the friends of authors and actors would naturally be expected to assist with their appreciation; and tears and laughter in an audience are well known to be infectious. As a paid institution, it is traditionally counted an invention of Nero's time. According to Suetonius, the actor emperor had a body of 5000 stalwart applauders, whose example the public were expected to follow.

It was in Paris, however, that the claque was first regularly organized into a trade. It is said to have owed its suggestion to a trick of the poet Dorat, who distributed free tickets to his dependents upon condition that they applaud. About 1820 two men named Porcher and Santon regularly established the business of insuring dramatic success (*l'assurance des succès dramatiques*) by supplying the theatres with

as many "claqueurs" as the authors or managers thought each piece would require. Since their day various *chefs de claque* have gained importance in a position which required discrimination and tact. They have relations directly with the management of the theatres, and commonly attend the last rehearsals of a piece, in order to study it in advance and receive instructions as to the points where demonstrations are expected. Their assistants are, as a rule, picked up merely for each occasion. The main body of the claque sits generally near the rear of the middle of the parterre, beneath the chandelier, from which they have been called *chevaliers du lustre.* Others are distributed in different parts of the house, according to their particular functions, which illustrates how minutely the art is organized. Thus, the connoisseur is bound to learn the play by heart, and call the attention of the audience about him to the fine points; the *rieur* or *rigolard* must laugh at every jest; the *pleureur* ("weeper") has to manifest sensibility at the moving passages. This last part is generally assigned to women, in whom the frequent use of the handkerchief seems most natural. The *chatouilleur* ("tickler"), on the other hand, endeavors, by distributing bonbons, theatre bills, etc., and by lively conversation, to keep his neighbors in good humor; and, lastly, the *bisseur* calls "*bis!*" with the utmost enthusiasm, at the conclusion of the specified pieces of music.

The following incident, which found its way into the newspapers on the occasion of the death of the famous French actress Rachel, shows the ludicrous seriousness with which the members of the claque view their singular profession: Mademoiselle Rachel had just created a new character in a modern piece, and during the first evening was loudly applauded. The next, however, she thought her reception by no means so warm, and she complained that the claque did not do its duty. Its leader, on hearing of Rachel's dissatisfaction, wrote to her as follows: "Mademoiselle—I cannot remain under the obloquy of a reproach from such lips as yours! The following is an authentic statement of what really took place: At the first representation, I led the attack in person not less than 33 times. We had three acclamations, four hilarities, two thrilling movements, four renewals of applause, and two indefinite explosions. In fact, to such an extent did we carry our applause, that the occupants of the stalls were scandalized, and cried out *A la porte!* My men were positively exhausted with fatigue, and even intimated to me that they could not again go through such an evening. Seeing such to be the case, I applied for the manuscript, and, after having profoundly studied the piece, I was obliged to make up my mind for the second representation to certain curtailments in the service of my men. I applied them, however, only to MM. ——, and if the *ad interim* office I hold affords me the opportunity, I will make them ample amends. In such a situation as that which I have just depicted, I have only to request you to believe firmly in my profound admiration and respectful zeal; and I venture to entreat you to have some consideration for the difficulties which environ me." In spite of the comic side of the business, the public is generally hostile, and there have been actual riots owing to ill-timed efforts of the claque to overcome popular disapproval of a play. Occasional efforts have been made, with partial success, for the abolition of the claque; but it still commonly prevails, and plausible arguments are urged in its justification.

The allegation that, in London, theatrical artists and managers are obliged to endeavor to insure success by means of a similar institution is strenuously denied, although there, and in Germany and the United States, similar artifices, not so publicly organized, are practiced to some extent.

CLARA, SAINT. See CLARE, SAINT.

CLARAC, klȧ'rȧk', CHARLES OTHON FRÉDÉRIC JEAN BAPTISTE, COMTE DE (1777–1847). A French painter and antiquarian. He superintended for a time the excavation at Pompeii, of which he gave an account in *Fouilles faites à Pompéi* (1813); was a member of the French Embassy in Brazil; and on returning to Paris was made keeper of the Museum of Antiquities in the Louvre, of which he published a catalogue. Others of his works are *Manuel de l'histoire de l'art chez les anciens* (1847), and *Musée de sculpture antique et moderne* (1826–52). The latter, an inventory of all the principal monuments in marble and bronze preserved in the various museums of Europe, is still consulted by archæologists and has been valuable for its promotion of the study of antique art in France.

CLARA VALLIS. See CLAIRVAUX.

CLÄRCHEN, klĕrK'en. A country maiden in love with Egmont, in Goethe's *Egmont.* After his death she poisons herself.

CLARE (Ir., plain; Welsh *clawr;* connected with Gk. κλῆρος, *klēros,* lot). A maritime county in the Province of Munster, Ireland, bounded north by Galway and Galway Bay; east and south by the Shannon and its expansion, Lough Derg, separating it from Tipperary, Limerick, and Kerry; west by the Atlantic (Map: Ireland, C 4). Area, 1332 square miles—more than half being arable, and only a small part in wood. The surface is mostly hilly, with some mountains, bogs, marshes, and rugged pastures. The southwest third of the county forms part of the Munster coal field. Less than one-fifth of the county is under cultivation, but fine sheep and cattle are raised on the pastures. There are fishing interests and manufactures of frieze and hosiery. The chief town is Ennis, the county town. Pop. (which has decreased steadily since 1841), 1901, 112,334; 1911, 104,232. Consult Frost, *History and Topography of the County of Clare* (Dublin, 1893).

CLARE, JOHN (1793–1864). An English peasant poet, born July 13, 1793, near Peterborough. He was taken from school at seven and employed on a farm, paying for such education as his meagre wages would allow. He became a servant in a public house, was apprenticed to a gardener, ran away, enlisted in the militia, lived among the gypsies, worked at a lime burner, and at one time was compelled to seek parish relief. In 1820 he published *Poems Descriptive of Rural Life and Scenery,* and later in the same year, his *Village Minstrel and Other Poems.* He became famous, was patronized and flattered, fell into dangerous habits, and, becoming insane, died in a private asylum, May 20, 1864. Though helped much by his friends, Clare was always poor. When very young he learned old songs, which first led him to verse making. Afterward he came across Thomson's *Seasons,* which he read constantly. His poems deal with rustic scenes and the incidents of village life. They are spontaneous and musical, but lack

vigor. For his life, consult: Martin (London, 1865); Cherry, *Life and Remains* (London, 1873); and A. Symons's introduction to *Poems* (London, 1908) of Clare, for a critical study.

CLARE, or **CLARA,** SAINT (1191–1253). The founder of the Order of Poor Clares, the Franciscan Order for women. She was a member of a rich and noble family of Assisi, in the Duchy of Spoleto. Attracted by the eloquence and piety of St. Francis of Assisi, she abandoned the pleasures of social life, in which she had previously indulged, and betook herself to solitude, prayer, and mystic meditation. With the advice of St. Francis she founded her Order in 1212, and, after obtaining a great reputation for sanctity, died at Assisi, Aug. 11, 1253. Two years afterward she was canonized by Pope Alexander IV. (See CLARES, POOR.) Consult Demore, *Vie de Sainte Claire d'Assisi* (Paris, 1856).

CLARE COLLEGE. One of the colleges of the University of Cambridge. It was founded as "University Hall" by the university in 1326. Ten years later its advowson or patronage was made over to Elizabeth de Burgh, Countess of Clare, by the chancellor of the university, Richard de Baden. Part of the great estates she had inherited by the death of her brother at Bannockburn she devoted to refounding this hall, first as Clare Hall, with the particular object of educating clergy to take the place of those swept off by the plague. In later generations the college departed from this pious purpose somewhat, though it was especially noted in the sixteenth and seventeenth centuries for its divines, who were learned, if somewhat too liberal-minded for their times. Bishop Latimer was a fellow of the college, as was Archbishop Tillotson; Cudworth was master, and among the other members of the seventeenth century may be noted William Whiston and Thomas Burnet. Wheelock, the Anglo-Saxon scholar, and Maseres, the mathematician, were also members of Clare. The buildings of the college have suffered very frequently from fire. The present quadrangle, one of the most beautiful in Cambridge, was begun in the seventeenth century; but the work was interrupted by the Civil War, and it was not completed till 1715. The present foundation consists of a master, 15 fellows, 31 scholars, besides undergraduates who in 1913 numbered 238. Consult J. R. Wardale, *Clare College* (London, 1899).

CLARE ISLAND. An island off the west coast of Mayo, Ireland, at the entrance of Clew Bay (Map: Ireland, A 3). It has a length of 4½ miles, with a breadth of 2 miles. On its northeast extremity there is a lighthouse at an elevation of 487 feet above the sea. Pop., 1000.

CLARE'MONT (Fr., fair mount). A mansion at Esher, in Surrey, England, 15 miles southwest of London. It was the home of Prince Leopold of Saxe-Coburg (later King of the Belgians) in the early part of the nineteenth century, and from 1848 to 1850 the residence of the exiled Louis Philippe, King of the French, who died there. In consequence, Claremont became the headquarters of the Orléans party.

CLAREMONT. A city in Los Angeles Co., Cal., 37 miles east of Los Angeles; on the Atchison, Topeka, and Santa Fe Railroad. It is the seat of Pomona College, established in 1888. Fruit growing, especially the raising of oranges and lemons, is the principal industry. Pop., 1910, 1114.

CLAREMONT. A town in Sullivan Co., N. H., 55 miles northwest of Concord; on the Boston and Maine Railroad (Map: New Hampshire, D 6). It is also on the Sugar River, which furnishes abundant water power. The town has manufactures of cotton and woolen goods, paper, diamond drills, machinery, machinery supplies, shoes, and lumber; and there are granite and marble yards. Claremont contains a Carnegie library, and owns its water works. Pop., 1900, 6498; 1910, 7529.

CLAREMORE. A city and the county seat of Rogers Co., Okla., 25 miles northeast of Tulsa, on the St. Louis and San Francisco and the St. Louis, Iron Mountain, and Southern railroads (Map: Oklahoma, F 2). Springs with medicinal properties, discovered in 1903, have made Claremore a popular health resort. The city contains also a fine State preparatory school. There are oil and stock-raising interests and manufactories of brick. The water works and electric light and power plant are owned by the municipality. Pop., 1900, 2064; 1910, 2866.

CLAR'ENCE, DUKE OF. A title occasionally given to a younger member of the British royal family. It was first bestowed on Lionel, the second son of Edward III. In recent years it was held by Albert Victor Christian Edward (1864–92), the eldest son of King Edward VII, then Prince of Wales.

CLARENCIEUX, klăr'en-shōō *or* -sū. An English heraldic officer, the first of the two provincial kings-of-arms, the second being Norroy. The jurisdiction of Clarencieux extends over all England south of the Trent, that of Norroy comprehending the portion north of that river. Clarencieux is named after the Duke of Clarence, third son of King Edward III. It is his duty to visit his province, to survey the arms of all persons bearing coat armor within it, to register descents and marriages, and to marshal the funerals of all persons who are not under the direction of Garter. He also grants arms within his province, with the approval of the Earl Marshal. See GARTER KING-AT-ARMS; HERALDS' COLLEGE; KING-AT-ARMS.

CLAR'ENDON. A lodge in Wiltshire, near Salisbury, England, where the "Constitutions of Clarendon," fixing the limits of the jurisdiction of the civil and ecclesiastical courts, were drawn up in 1164.

CLARENDON. A city and the county seat of Monroe Co., Ark., 60 miles (direct) east of Little Rock; on the White River and on the St. Louis Southwestern and the St. Louis, Iron Mountain and Southern railroads (Map: Arkansas, D 3). It is in a rich cotton-growing region and has lumber mills, boat-oar, barrel, button, plow-beam, wagon-material, telegraph and telephone supply, and shoe-last factories; a foundry, cotton gins, saw and planing mills, and bottling works. Pop., 1900, 1840; 1910, 2037.

CLARENDON. A town in Rutland Co., Vt., 6 miles south of Rutland; on the Rutland Railroad (Map: Vermont, B 5). The principal industries are dairying, fruit raising, and maple-sugar making. The locality is visited for its mineral springs, the waters of which are of considerable medicinal value. It is governed by an annual town meeting. Pop., 1910, 857.

CLARENDON, ASSIZE OF. A series of decrees issued by Henry II of England in 1166. By these he ordered (1) that in each county juries consisting of 12 men from each hundred, and four men from each vill should present

for trial before his justices all who were accused, or publicly suspected, of robbery or murder, or of harboring robbers or murderers; (2) that the system of frankpledge (q.v.) should be carried out more fully. Section 21 treated of the heretics who had recently appeared in England and was the first secular legislation against heresy in the west of Europe since the days of the Roman Empire. Consult Stubbs, *Select Charters Illustrative of English Constitutional History* (7th ed., Oxford, 1890). A translation can be found in Adams and Stephens, *Select Documents of English Constitutional History* (New York, 1901).

CLARENDON, CONSTITUTIONS OF. A body of laws defining the spheres of ecclesiastical and secular jurisdiction in the courts of England, adopted in 1164. In that year Henry II summoned the whole body of bishops and barons to a council at Clarendon, and some of the oldest members of the council were ordered to set down in writing the customs in use under Henry I. The report was to be made the basis for the definite determination of the disputes between the King and the clergy. The document known as the "Constitutions of Clarendon" was presented as the result of the inquiry. The constitutions were 16 in number. The substance of the most important articles was as follows: Members of the clergy accused of crime should be sent to the ecclesiastical courts for trial, and, if there convicted, were to be turned over to the law courts for further punishment. There was to be no appeal to Rome without the consent of the King. No beneficed clergyman might leave the realm without the King's consent. No villein could be ordained without the consent of his lord, and no tenant in chief of the King could be excommunicated without the King's knowledge. In addition to these subjects, the "constitutions" decided that questions of advowson and presentation should be tried in the King's court; that election to bishoprics and abbacies should be in the King's presence; and that the King had a right to the goods of felons deposited under the protection of the Church. Finally, the questions of titles to ecclesiastical estates, the trial of laymen for spiritual offenses, and the bestowal of churches in the King's gift were determined.

A great authority upon the "Constitutions of Clarendon" says: "They are no mere engine of tyranny, or secular spite, against a churchman; they are really a part of a great scheme of administrative reform, by which the debatable ground between the spiritual and temporal powers can be brought within the reach of common justice, and the lawlessness arising from professional jealousies abolished." The enactment of the "Constitutions of Clarendon" brought to a crisis the dispute between Henry II and Thomas à Becket, who made himself the champion of the ecclesiastical power, siding with Pope Alexander III when the latter rejected the "constitutions." Though the King had to undergo penance after the murder of Becket, some of the provisions of the "Constitutions of Clarendon" remained permanent gains to the civil power. Consult: Stubbs, *The Constitutional History of England,* vol. i (Oxford, 1896); Pauli, *Geschichte von England* (Gotha, 1853–58); and for the text of the "Constitutions," Stubbs, *Select Charters Illustrative of English Constitutional History* (7th ed., Oxford, 1890).

CLARENDON, EDWARD HYDE, EARL OF (1609–74). An English historian, and Chancellor of Charles II. The son of Henry Hyde, a private gentleman, he was born at Dinton, Wiltshire, Feb. 18, 1609. Destined for the church, he proceeded to Magdalen College, Oxford, where he was graduated Bachelor of Arts, Feb. 14, 1626. But instead of the clerical profession, he entered the Middle Temple, under his uncle, Chief Justice Sir Nicholas Hyde, treasurer of the society, and was called to the bar Nov. 22, 1633. His intimate friends were the brilliant *literati* of the period—Ben Jonson, Waller, Selden, Carew, Chillingworth, Hales, Falkland, and others. To them in after years he attributed much of his knowledge and worldly experience. He was twice married—his first wife dying after six months—and by both alliances gained wealth and political influence. In 1634 he became Keeper of the Writs and Rolls of the Common Pleas, and by some brilliant defense work acquired an extensive law practice. He came into high favor with Laud and was frequently consulted by him. He entered the "Short Parliament" of 1640 for Wootton Bassett and distinguished himself as a supporter of the Popular party. He represented Saltash in the "Long Parliament," but as an Episcopalian he eventually seceded from the Popular party on ecclesiastical questions, and thereby gained the King's favor. He headed the Royalist party in the Commons and counseled conciliation by a persistent appeal to the "known laws of the land." He was the author of most of the King's answers to the parliamentary manifestoes. At the outbreak of the Civil War he attached himself to the royal cause and in 1643 was knighted and made Chancellor of the Exchequer and Privy Councilor. After viewing the battle of Edgehill he joined Prince Charles (Charles II) in the West, and accompanied him in his flight to Jersey. He remained in that island for two years and began his *History of the Rebellion.* In June, 1648, after capture and spoliation by an Ostend pirate, he rejoined Prince Charles at The Hague. He exerted himself to save the life of Charles I, and after that monarch's execution was retained as counselor by Charles II, in 1649, going to Spain on an unsuccessful mission for assistance. At Charles's request he rejoined him in Paris, and as the King's most trusted adviser there, as also in Cologne and Bruges, spent the next nine years, frequently in abject poverty. Charles formally declared him Lord Chancellor in 1658. At the Restoration in 1660 Charles confirmed this appointment and in November of this year created him Baron Hyde. He also became chancellor of Oxford University and in April, 1661, he was created Viscount Cornbury and Earl of Clarendon. In September, 1660, his daughter Anne formed a secret marriage with the Duke of York, afterward James II, and subsequently became the mother of Mary and Anne, the future English queens. The King and Clarendon were wroth; but Clarendon's indignation was somewhat overacted, and excited an aftersuspicion that he deliberately proposed the barren Catharine of Braganza as Charles II's consort, to provide for his posterity's succession to the throne. During his premiership the settlement of Scotland and Ireland owed much to him, and he took a leading part in colonial extension. He was one of the eight proprietors to whom the first Carolina Charter was granted in 1663, the Cape Fear establishment being named "Clarendon

County" after him. He also helped the Presbyterian Baxter, to whom he offered a bishopric, in the incorporation of a company for the propagation of the gospel in New England. The ill success of the Dutch War and the sale of Dunkirk to the French aroused public indignation, and he became exceedingly unpopular. In 1663 the Earl of Bristol unsuccessfully accused him of bribery in the House of Lords, but in 1667 he fell a victim to court intrigue; and having offended the King by opposing his divorce, that he might marry Fanny Stewart, whom Clarendon induced the Duke of Richmond to wed, Charles deprived him of his offices and indirectly advised him to withdraw to Calais. Clarendon sent a vindication to the Lords, which both houses of Parliament ordered to be burned by the common hangman. After being almost murdered by some English sailors at Evreux, he lived in exile for six years, sending humble appeals to be allowed to pass his remaining years on English soil. He died in Rouen, Dec. 9, 1674, and was buried in Westminster Abbey.

In a generally profligate court he was almost the only moral man, and was distinguished for his unswerving fidelity to the Episcopal church and his determined maintenance of what he considered the true and ideal English constitution. He was a ready debater and pleasing speaker, but it is for his literary productions that he is best remembered. The first edition of his great *History of the Rebellion* (Oxford, 1702–04) was not printed from the original manuscript, and some passages were slightly altered by the editors. A complete edition, by Dr. Bandinel, first appeared in 1826; while the best edition, in 6 vols., was published at Oxford in 1888. He wrote also a *Life of Edward Hyde, Earl of Clarendon*, with a *Continuation of the History of the Grand Rebellion from the Restoration to his Banishment in 1667* (1759); and a *History of the Rebellion and Civil War in Ireland* (1720). Consult: Agar-Ellis, *Historical Inquiry Respecting the Character of Edward Hyde, Earl of Clarendon* (London, 1827); Lister, *Life and Administration of Edward Hyde, First Earl of Clarendon* (London, 1837–38); Lewis, *Lives of the Friends and Contemporaries of Clarendon* (3 vols., London, 1852); Campbell, *Lives of the Lords Chancellors*, vol. iii (London, 1869); Oldmixon, *Clarendon and Whitelocke Compared* (2d ed., London, 1787); Craik, *Life of Edward, Earl of Clarendon* (New York, 1911); Firth, *Edward Hyde, Earl of Clarendon* (Oxford, 1909); and the histories of Green, Ranke, and Gardiner.

CLARENDON, GEORGE WILLIAM FREDERICK VILLIERS, fourth EARL OF (1800–70). An English diplomat and statesman, the eldest son of George Villiers and grandson of Thomas Villiers, who in 1752 married the heiress of the last Lord Clarendon of the Hyde branch, and was created Baron Hyde, 1756, and Earl of Clarendon, 1776. He was born in London, Jan. 12, 1800. He entered St. John's College, Cambridge, in his sixteenth year, and by titular privilege attained the M.A. degree in 1820. The same year he entered the diplomatic service as an attaché to the British Embassy at St. Petersburg, and at 23 years of age had acquired practical experience that was of particular value in his subsequent career. He was an accomplished linguist and writer. Appointed Commissioner of Customs in 1823, in 1827–29 he gained administrative knowledge in arranging the union of the English and Irish excise boards, and an insight into Irish character and affairs which made him an authority with Lord Lieutenant Paget, Marquis of Anglesey. In 1831, as coadjutor to Sir John Bowring, he successfully negotiated a commercial treaty with France, and in 1833 was sent as envoy extraordinary and minister plenipotentiary to Madrid, where he acquired great influence and a lifelong popularity. He was rewarded with the Grand Cross of the Bath in 1837, and at his uncle's death, Dec. 22, 1838, succeeding to the Clarendon peerage as fourth Earl, he returned to England to take his seat in the House of Lords. He entered Lord Melbourne's administration as Lord Privy Seal in 1840, and also became chancellor of the Duchy of Lancaster. When the ministry fell, in 1841, he became an active member of the Opposition, but, as a stanch free trader, warmly supported Sir Robert Peel's measures for the repeal of the Corn Laws. Under Lord Russell he became President of the Board of Trade in 1846, and in the following year was appointed Lord Lieutenant of Ireland. The insurrectionary follies of Smith O'Brien and his followers were agitating the country; but Clarendon's prompt and decisive measures soon restored tranquillity, while his tact and impartiality allayed party feeling. In 1852, under Lord Aberdeen, and in 1855–58, under Lord Palmerston, Clarendon was Foreign Secretary. Upon him fell the burden of the Crimean War; he personally attended the Congress of Paris, and the peace of 1856, with its beneficial results to European politics, testifies to his foresight and ability. He retired with the ministry in 1858; resumed the Foreign Secretaryship in 1865–66, and held it again under Gladstone from 1868 until his sudden death, June 27, 1870. Consult Thornton, "Life of George William Frederick Villiers, Fourth Earl of Clarendon," in *Foreign Secretaries of the Nineteenth Century*, vol. iii (London, 1881–82).

CLARENDON PRESS. A printing and publishing establishment connected with Oxford University (England). It was founded in 1672, and named Clarendon, because the printing house was paid for by the profits on the sale of Lord Clarendon's *History of the Rebellion*, of which work the university has a perpetual copyright. It now has an American branch.

CLARENS, klȧ'răN'. One of a number of villages in the Canton of Vaud, Switzerland, scattered along the shores of Lake Geneva. It is 3½ miles southeast of Vevey, and 1200 feet above sea level (Map: Switzerland, A 2). The town is charmingly situated, has a mild climate, and is a favorite resort for invalids. It is known as the scene of Rousseau's *La Nouvelle Hélöise*.

CLARES, klȧrz, POOR, or CLARISSES. A religious order founded by St. Clare, with the counsel and help of St. Francis of Assisi, in 1212. At first the nuns observed the rule of St. Benedict, but in 1224 the austerity of this rule was mitigated by St. Francis, and again modified by Urban IV in 1263. The order rapidly increased, and by the end of the sixteenth century numbered nearly 50,000. The nuns devote themselves chiefly to the education of the young. They are under the jurisdiction of the General and Provincials of the Friars Minor. In 1875 two sisters came to the United States from Rome; in 1877 others came from Germany. They had in 1911, in the United States, 7 convents and 204 professed sisters; in England, 11

convents; in Scotland, 1; and in Ireland, 9. The English follow the reform of St. Colette, who in 1436 brought back many French, Belgian, and German converts to the strict Franciscan rule.

CLARET. See WINE.

CLARETIE, klär'tē', JULES (properly ARSÈNE ARNAUD) (1840–1913). A French author and theatrical manager, born at Limoges (Haute-Vienne). He studied at the Lycée Bonaparte of Paris, and became known as a feuilletonist and dramatic critic. During the Franco-Prussian War he acted as correspondent for Paris papers for a brief period. His first play won but moderate success (*La famille des Gueux*, 1869), but subsequently dramatizations of several of his own works of fiction, such as *Les Muscadins* (2 vols., 1874, and presented as a play in that year) and *Le Prince Zilah* (1884; presented in 1885), established him upon the French stage. In 1907 he wrote and had produced the drama *Thérèse*. In 1885 he became director of the *Comédie française*, whose traditional excellence he sought to maintain. He is best known, however, for his novels and historical and critical works. Among the former are, in addition to the two already named, *L'Assassin* (1866), *Monsieur le Ministre* (1882), *Puyjoli* (1890), and *L'Accusateur* (1897). From the latter may be cited *Histoire de la révolution de 1870–71* (new ed., 5 vols., 1875–76); *Cinq ans après* (1876), a study of postbellum conditions in Alsace-Lorraine; *Les Prussiens chez eux* (1872). Among his critical works may be mentioned *La vie moderne au théâtre* (1868–69); *Molière* (1871); and *Histoire de la littérature française* (2d ed., 1905). In 1888 Claretie was elected to the Académie Française.

CLARI, klä'rē, **THE MAID OF MILAN.** An opera by Sir Henry Bishop (1823), introducing John Howard Payne's "Home, Sweet Home," which was written expressly for it.

CLARIFICATION. See FINING.

CLARIN'DA. A city and the county seat of Page Co., Iowa, 79 miles by rail southeast of Council Bluffs; on the Nodaway River, and on the Chicago, Burlington, and Quincy Railroad (Map: Iowa, B 4). It is in an agricultural and stock-raising region, which has also some coal deposits. The city exports live stock, poultry, butter, eggs, seeds, grain, and coal; and there are flour mills, carriage works, brickyards, lawn-mower and well-boring machine factories, a foundry, a creamery, a cold-storage plant, an ice plant, etc. Clarinda contains a public library, and owns its water works. The State Asylum for the Insane is a short distance from the city. Pop., 1890, 3262; 1900, 3276; 1910, 3832.

CLAR'INET' (Fr. *clarinette*, from It. *clarinetto*, dim. of *clarino*, clarion, from *claro*, Lat. *clarus*, clear), or CLARIONET. A wood-wind instrument of the reed kind, developed by Joseph Christopher Denner, in Nuremberg, in 1690, from the chalumeau, a primitive wind instrument, by the addition at the nodal point of a small hole and key, which gave an additional register, one-twelfth higher. Its tone is produced by a thin piece of Spanish reed nicely flattened and tied, or otherwise fixed to the mouthpiece. On the body of the instrument there are 18 holes, 13 of them with keys for the fingers of the performer, by which the notes are produced. In extent ($3\frac{1}{2}$ octaves, from e to c^4), fullness, and variety of tone, the clarinet is the most perfect of wind instruments. Its construction, however, does not admit of every key in music being played on the same instrument; for which reason clarinets of different pitch, generally A, B♭, and C, also a bass clarinet (usually in B♭) are used in orchestra music. Mozart's familiar E♭ major symphony is the first work of its kind in which clarinets were employed. Consult W. Altenburg, *Die Klarinette* (Heilbronn, 1904). See ORCHESTRA.

CLAR'ION. A borough and the county seat of Clarion Co., Pa., about 100 miles (direct) north-northeast of Pittsburgh, on the Pennsylvania Southern Railroad, and on the Clarion River, here spanned by a State bridge (Map: Pennsylvania, B 3). It is the seat of a State Normal School and has an attractive courthouse. The surrounding region produces natural gas, oil, and lumber, and there are coal works and cigar and glass-bottle factories. Clarion was settled in 1839 and was incorporated in 1841. The government is administered by a burgess, elected every three years, and a unicameral council. Pop., 1900, 2004; 1910, 2864.

CLARIS'SA HAR'LOWE. A novel, by Samuel Richardson, published in 1748. See HARLOWE, CLARISSA.

CLARISSES, klä'res'. See CLARES, POOR.

CLARK, ABRAHAM (1726–94). An American patriot, a signer of the Declaration of Independence. He was born near Elizabeth, N. J.; practiced law for a time, and was called the "poor man's councillor"; and, on the approach of the Revolutionary War, identified himself with the patriot cause. He was elected to the Provincial Congress in 1775; was a member of the Continental Congress in 1776–78, 1780–83, and 1785–88; was a delegate to the Annapolis Convention (q.v.) in 1786, and from 1791 to 1794 was a member of Congress.

CLARK, ALBERT CURTIS. An English classical scholar. He was educated at Oxford, graduated at Queen's (1882) and became (1884) fellow and tutor of Queen's College and (1909) university reader in Latin. His great work was as an editor of the Oxford *Cicero*, and as an investigator, after Zielinski, of rhythmic *clausulæ* in Cicero's prose and in other authors. He edited *Asconius* (1907) and *Fontes Prosæ Numerosæ* (1909); wrote *The Cursus in Mediæval and Vulgar Latin* (1910), and *Prose Rhythm in English* (1913).

CLARK, ALONZO (1807–87). An American physician. He was born in Chester, Mass., and graduated in 1828 at Williams, and in 1835 at the New York College of Physicians and Surgeons, where he was professor of physiology and pathology from 1848 to 1855, and of pathology and practical medicine from 1855 to 1885, and dean and president of the faculty in 1875–85. Possibly his most important publication was *Lectures on Diseases of the Heart* (1889).

CLARK, ALONZO HOWARD (1850–). An American ichthyologist, born in Boston. He studied at Wesleyan University; in 1883 was a member of the United States Commission at the International Fisheries Exhibition, London, and in 1889 was sent as expert commissioner to the Paris Exposition of that year. From 1889 to 1908 he was assistant secretary of the American Historical Association. His publications include: *Statistics of Fisheries of Massachusetts* (1882); *History of the Mackerel Fishery* (1883); and *A National Register of the Society of the Sons of the American Revolution* (1902).

CLARK, ALVAN (1808–87). An American optician, born at Ashfield, Mass. The son of a farmer, he became a self-taught engraver, portrait painter, and optician, and was employed as an engraver in a calico-print manufactory at Lowell, Mass. After being a portrait painter in Boston, he began the manufacture of telescopes at Cambridgeport, Mass., about 1844, and completed the first achromatic lenses made in the United States. He also devised an ingenious eyepiece for measuring celestial arcs of lesser magnitudes. The chief telescopes of recent times have been the work of his establishment. *The Proceedings of the Royal Astronomical Society*, vol. xvii (London, 1857), contains the list of his own discoveries with his telescopes. See TELESCOPE.

CLARK, ALVAN GRAHAM (1832–97). An American optician and astronomer, born at Fall River, Mass., son of Alvan Clark, with whom he was associated in the manufacture of telescopes. Among the great telescope lenses made by him are those in the Lick Observatory in California (36 inches in diameter), and in the Naval Observatory at Washington (26 inches); the 30-inch refractor for the Nicholas Central Observatory of Pulkowa; and the great 40-inch lens, the largest in actual use, for the Yerkes Observatory (at Williams Bay, Wis.) of the University of Chicago. He was also active as an astronomical observer, and made many discoveries of double stars, including that of the companion of Sirius (January, 1862; after Safford's determination of its position), for which he received the Lalande gold medal of the French Academy. See TELESCOPE.

CLARK, SIR ANDREW (1826–93). A British physician, born in Aberdeen, Scotland, and educated at the University of Aberdeen and in Edinburgh. He joined the medical department of the navy in 1848 and was appointed pathologist to the Haslar Hospital (1849), curator of the museum of the London Hospital (1853), and assistant physician of this hospital (1854). After 1854 he was connected with the College of Physicians, as member, fellow, and officer—from 1888 to his death he was president. Meanwhile he built up a large practice in London, and counted among his patients many of the notable persons of his day. He wrote on various subjects, especially tuberculosis, a tendency to which he himself had had all his life.

CLARK, CHAMP (1850–). An American politician, born in Anderson Co., Ky., and educated at Kentucky University, at Bethany College, and at the Cincinnati Law School. In 1873–74 he was president of Marshall College, W. Va. He was city attorney of Louisiana, Mo., and afterward of Bowling Green, Mo., and was prosecuting attorney of Pike County, in that State. In 1904 he was chairman of the National Democratic Convention, at St. Louis, and chairman of the committee which notified Judge Parker of his nomination to be the Democratic candidate for the presidency. He was elected Democratic Representative from the Ninth District of Missouri in 1893, and from 1897 was reëlected to the three succeeding congresses. He was chosen Speaker of the House in the Sixty-second Congress partly as a reward for the ability he had displayed as minority leader in the preceding Congress. Mr. Clark brought impartiality and dignity to the speakership, and was notably successful in perfecting the organization of the House and in establishing absolute discipline; and among those of his own party at Washington his council came to have much weight. Speaker Clark was one of the leading candidates for the presidential nomination at the National Democratic Convention, Baltimore, 1912; and it was only on the forty-sixth ballot that his chief competitor, Woodrow Wilson, obtained the nomination. This result was hastened by W. J. Bryan, who threw his support over to Wilson, alleging that Mr. Clark was allied with Tammany Hall. The charge, vehemently denied by Mr. Clark, aroused the most bitter feeling among the latter's supporters against Bryan. But the defeated nominee himself loyally supported the Democratic ticket in the ensuing campaign.

CLARK, CHARLES EDGAR (1840–). An American naval officer, born at Bradford, Vt. He entered the United States Naval Academy in 1860 and in 1863 was made an ensign. Subsequently he served on the steam sloop *Ossipee*, of the Western Gulf Blockading Squadron in 1863–65; took part in the battle of Mobile Bay and in the bombardment of Fort Morgan (1864); was commissioned a lieutenant commander in 1868, and in that year was serving on the *Suwanee* when she was wrecked off Vancouver Island. He was stationed at the Naval Academy in 1870–73, became a commander in 1881, was lighthouse inspector in 1887–91, and was stationed at the Mare Island Navy Yard in 1891–93. Promoted to captain in 1896, he was transferred from the *Monterey* at the Mare Island Navy Yard, San Francisco, to the command of the battleship *Oregon*. In this vessel he sailed from San Francisco on March 19, 1898, and covered the 13,000 miles around Cape Horn to Key West in 65 days, thereby establishing a new record for a sea voyage under such conditions. Under command of Captain Clark, the *Oregon* at once joined Admiral Sampson's squadron, and bore an important part in the destruction of Admiral Cervera's fleet. He was advanced to rear admiral in 1902, was afterward governor of the United States Naval Home at Philadelphia, and retired in August, 1905.

CLARK, CHARLES HOPKINS (1848–). An American newspaper editor, born in Hartford, Conn. He graduated from Yale in 1871 and in the same year became connected with the Hartford *Courant*, the oldest newspaper continuously published in America. After 1890 he was editor in chief of this paper. He was president and director of many important financial institutions and companies, and from 1909 to 1913 was treasurer and member of the commission on the State Reformatory. In 1910 he received the degree of L.H.D. from Trinity College.

CLARK, CHARLES KIRK (1857–). A Canadian physician and alienist. He was born at Elora, Ontario, and graduated at Toronto University in 1878. In 1880 he was appointed assistant medical superintendent of the Hamilton Insane Asylum, and for 20 years after 1885 he was medical superintendent of the Rockwood Asylum for the Insane at Kingston, while at this post serving also as professor of mental diseases at Queen's University. In connection with the asylum he founded a home for nurses and convalescents. Of the *American Journal of Insanity* he became coeditor in 1904. He was appointed medical superintendent of the Toronto Asylum for the Insane in 1905, professor of psychiatry in Toronto University in

1907, and dean of that institution's medical faculty in the following year. In 1907 he was also a member of the royal commission for the study of methods of treatment of the insane in Europe. His contributions on alienistic subjects to various journals gained him a high reputation.

CLARK, CLARENCE DON (1851–). An American legislator, born at Sandy Creek, N. Y. He was educated at Iowa State University, practiced law in Delaware Co., Iowa, and at Evanston, Wyo., and was a member of the constitutional convention of Wyoming, and a delegate to a number of Republican national conventions. Upon the admission of Wyoming as a State he was elected to the Fifty-first and Fifty-second Congresses; in 1895 was elected to the United States Senate to fill a vacancy, and in 1899 and 1905 was reëlected, and again in 1911 for the term ending 1917. In the Sixty-third Congress he was chairman of the Committee on Geological Survey, and was also a member of other important committees.

CLARK, DANIEL (1836–1912). A Canadian physician. He was born at Granton, Inverness-shire, Scotland; went to Canada in 1841, and graduated at Victoria University in 1858. He subsequently received from the University of Toronto the degree of M.D., studied at Edinburgh, and practiced at Princeton, Ontario. During the Civil War he was for a short time attached as volunteer surgeon to the Army of the Potomac, and in 1872 was elected a member of the Ontario Medical Council. He was afterward connected with various educational and charitable institutions, and in 1875 was appointed superintendent of the Provincial Lunatic Asylum, Toronto. He wrote *Pen Photographs* (1873); *Josiah Garth,* a novel; and other works.

CLARK, EDWARD (1822–1902). An American architect, born in Philadelphia, Pa. He studied architecture with Thomas U. Walter, and succeeded him as architect of the United States Capitol extension in 1865. He was appointed by Congress on the commission for the completion of the Washington Monument, and on the commission for the construction of the Congressional Library, and did other governmental work. He was a member of the American Institute of Architects, fellow of the Clarendon Historical Society of Edinburgh, and trustee of the Corcoran Art Gallery in Washington.

CLARK, EDWIN CHARLES (1835–). An English legal writer and teacher. He graduated at Trinity College, Cambridge, became a scholar and fellow of Trinity, and subsequently was appointed professorial fellow of St. John's, and was then regius professor of civil law in the university until 1914. He published: *Early Roman Law: Regal Period* (1872); *An Analysis of Criminal Liability* (1880); *Practical Jurisprudence* (1883); and *Cambridge Legal Studies* (1888); *Practical Jurisprudence: A Comment on Austin* (1888); *History of Roman Private Law* (1906).

CLARK, FRANCIS EDWARD (1851–). An American Congregational clergyman. He was born at Aylmer, Canada, Sept. 12, 1851; graduated at Dartmouth College in 1873, and at Andover Theological Seminary in 1876. He held a Congregational pastorate at Portland, Me., from 1876 to 1883, and was a pastor of Phillips Church, South Boston, in 1883–87. In 1881 he organized the Williston Young People's Society of Christian Endeavor in his church at Portland, and in 1887 became president of the United Society of Christian Endeavor, which sprang from it, and editor of its official organ, the *Golden Rule.* (See CHRISTIAN ENDEAVOR, SOCIETY OF.) He published: *The Children of the Church, and the Y. P. S. C. E. as a Means of Bringing them Together* (1888); *World-wide Endeavor, the Story of the Y. P. S. C. E. from the Beginning and in all Lands* (1896); *Fellow Travelers: A Personally Conducted Journey in Three Continents; A New Way Around the World* (1901), an account of experiences on the Trans-Siberian Railway; *The Continent of Opportunity* (South America) (1909); and other works in the interest of the society.

CLARK, GALEN (1814–1910). An American naturalist, born at Dublin, N. H. In 1853 he went to California and worked in placer mines, but within four years was serving as guide to parties of tourists to Yosemite Valley. In 1857 he discovered the great redwood growth at Mariposa, in 1864 he opened a small hotel at Wawona, and in 1865 was appointed commissioner and guardian of the newly created Yosemite Valley Park. He was succeeded by another, but for the last 20 years of his life was again guardian of the park. He was an intimate friend of John Burroughs, John Muir, and Joseph Le Conte, who considered him a high authority on the geology and natural wonders of the Sierra Nevada Mountains. He published *The Indians of Yosemite Valley* (1904); *The Big Trees of California* (1907); *The Yosemite Valley, its History, Characteristic Features, and Theories Regarding its Origin* (1910).

CLARK, GEORGE ROGERS (1752–1818). An American soldier and frontiersman, who rendered valuable services to the United States during the Revolutionary War. He was born near Monticello, in Albemarle Co., Va.; received a common-school education; made a tour west of the Alleghanies in 1772; became a land surveyor, and in 1774 served against the Indians in Lord Dunmore's War (q.v.). He spent some months in Kentucky in 1775; removed thither early in 1776, and soon became the recognized leader of the backwoodsmen. In June, 1776, he was chosen one of two delegates to represent Kentucky, then a district of Virginia, in the Virginia Legislature, and in this capacity not only brought about the organization of Kentucky as a separate county, but secured a large supply of much-needed powder for the use of the backwoodsmen. After his return he conceived a plan for the conquest of the "Illinois Country," and having won the support of Patrick Henry, then Governor of Virginia (to lay his plans before whom he had traveled on foot from Harrodsburg, Ky., to Williamsburg, Va.), he was appointed lieutenant colonel, raised the necessary troops, and proceeded to the site of Louisville, Ky. Starting from this point on June 28, 1778, he captured Kaskaskia (q.v.) on July 4, and by deputy secured the surrender of the other French villages, Cahokia and Vincennes. General Hamilton, the English commander at Detroit, recaptured Vincennes, then held by Captain Helm, in December; and Clark, upon hearing the news at Kaskaskia, put himself at the head of 170 men, and after an arduous march in the depth of winter, through swamps and dense forests, forced Hamilton to surrender on Feb. 24, 1779. (A monument to Clark, commemorating these feats, was erected at Vincennes in 1905.)

Early in 1780 he built Fort Jefferson, on the left bank of the Mississippi, a short distance below the mouth of the Ohio. From this time until the close of the war he was engaged almost constantly in warfare against the British and Indians, totally defeating the Shawnees, destroying the Indian villages along the Big Miami, and rising to the rank of brigadier general of Virginia militia. After the close of the war he led an unsuccessful expedition against the Wabash Indians in 1786, came into conflict with the Spanish authorities in the West, and seems to have advocated an expedition, which he was to lead, for the capture of Natchez and St. Louis and the opening of the Mississippi to unrestricted navigation. In 1793, during the pro-French agitation in the United States, he was commissioned a general by the French government, and issued a call for volunteers for the purpose of reconquering the Spanish possessions along the Mississippi on behalf of the French. He passed the latter part of his life in poverty at Clarksville, in Indiana, near Louisville, Ky., on part of the land granted him by the Virginia Legislature.

Clark's services during the Revolutionary War were of the utmost value to the United States government, inasmuch as the virtual conquest of the Northwest served as, perhaps, the chief basis of the American claim, in the peace negotiations of 1782–83, to the territory between the Mississippi and the Alleghanies. But for this conquest, according to many historians, the western territory would probably have passed either to England or to Spain. In recognition of his services, the Virginia Legislature, in 1783, granted him a tract of 8049 acres—140,000 more being granted to his officers and men—in the present State of Indiana, and on two occasions presented him with a sword. Clark wrote two accounts of his expedition—one of which, his *Letter to George Mason, of Virginia*, was first published in Cincinnati in 1869; and the other, entitled his *Memoir*, and written probably in his old age, at the request, it is said, of Presidents Jefferson and Madison, was first published in part in Dillon's *Indiana* (1843). Consult: English, *The Conquest of the Country Northwest of the Ohio River, 1778–83, and Life of George Rogers Clark* (Indianapolis, 1896); and Roosevelt, *Winning of the West*, vols. i and ii (New York, 1889); Butterfield, *History of G. R. Clark's Conquest of the Illinois and the Wabash Towns* (Columbus, 1904). Many documents relating to Clark and the conquest of the Illinois country are to be found among the Draper Manuscripts, in the Library of the Wisconsin Historical Society, Madison, Wis.

CLARK, HENRY JAMES (1826–73). An American naturalist, born at Easton, Mass. He graduated at New York University in 1848; then studied botany under Asa Gray at the Cambridge Garden, and later under Agassiz at Harvard. On graduating from the Lawrence Scientific School (1854), he remained with Agassiz in the capacity of private assistant until 1863. With Agassiz he did important work on the embryology of the turtle (1857). In 1860 he was made adjunct professor of zoölogy at the Lawrence School. In 1864 he delivered a course of lectures, *Mind in Nature* (published 1865), at the Lowell Institute, and from 1866 to 1869 was professor of the natural sciences at the Pennsylvania Agricultural College. From 1869 to 1872 he held a similar post at the University of Kentucky, and during the last year of his life was professor of veterinary science at the Massachusetts Agricultural College, in Amherst. Consult Packard's "Memoir" in *Biographical Memoirs of the National Academy of Sciences* (Washington, 1877).

CLARK, HUBERT LYMAN (1870–). An American zoölogist, born at Amherst, Mass., and educated at Amherst College and Johns Hopkins University. He was professor of biology at Olivet (Mich.) College from 1899 until 1905, when he became an assistant in invertebrate zoölogy in the Museum of Comparative Zoölogy, Harvard. Scientific investigations, leading to the publication of numerous papers, were carried on by him in Jamaica and Bermuda. He was a contributor to the NEW INTERNATIONAL ENCYCLOPÆDIA in 1900–03. His publications include: *The Birds of Amherst and Vicinity* (1887); *The Echinoderms of Porto Rico* (1901); *A New Ophiuran from the West Indies* (1910); *North Pacific Ophiurans in the Collection of the United States National Museum* (1911).

CLARK, ISAAC (1833–). An American theologian, born at Canterbury, Conn. He was educated at Yale University, Union Theological Seminary, and Andover Theological Seminary, and was ordained at Elmira, N. Y. (1861–68); Aurora, Ill. (1868–72); Brooklyn (Elm Place Church, 1872–74); Rondout, N. Y. (1874–82); and the Edwards Church (Congregational), Northampton, Mass. (1882–91). In 1891 he became professor of theology, homiletics, and English exegesis at Howard University (Washington, D. C.), and after 1901 was in addition dean of that institution's theological school.

CLARK, SIR JAMES (1788–1870). An English physician. He studied law and then medicine, practiced in Rome in 1819–26 and then in London, and on the accession of Victoria, was appointed physician in ordinary to her Majesty, and attended the Queen on most of her journeys to Scotland and the Continent. He was made a baronet in 1838. He wrote *The Influence of Climate in the Prevention and Cure of Disease* (1829), and *A Treatise on Pulmonary Consumption* (1835).

CLARK, JOHN BATES (1847–). An American economist, born at Providence, R. I., Jan. 26, 1847, and educated at Brown University, Amherst College, and at the universities of Heidelberg and Zurich. He was appointed professor of political economy and history in Carleton College, Minn., 1877; professor of history and political science in Smith College, 1881; professor of political economy in Amherst College, 1892; and in Columbia University, 1895. For three years (1892–94) he was lecturer on economics in the Johns Hopkins University, and (1893–95) was president of the American Economic Association. In 1911 he was appointed director of the division of economics and history of the Carnegie Endowment for International Peace. Besides numerous articles in scientific periodicals, he has published the following works: *The Philosophy of Wealth* (1885); *Capital and its Earnings* (1888); *Wages* (1889); *The Distribution of Wealth* (1901); *The Control of Trusts* (1901); *The Problem of Monopoly* (1904; revised, in collaboration with John Morris Clark, 1912); *Essentials of Economic Theory* (1907). Since the death of Francis A. Walker, Professor Clark has occupied the first place among American economists. The distinguishing features of Professor

Clark's economic theory are his distinction between the static and dynamic forces in economic life; his derivation of value from effective utility; and his explanation of interest in terms of the productivity of capital. In his social political teachings Professor Clark defends the essential justice and beneficence of an economic system based upon free enterprise. The chief defects in the existing economic system are, in his view, an outgrowth of monopoly, and can be removed by appropriate legislative measures. Professor Clark does not limit the economic sphere of the state to the protection of property and the restraint of monopoly, but offers a qualified defense, on dynamic grounds, of protection and other measures usually regarded by economists as paternalistic.

CLARK, JOHN WILLIS (1833–1910). An English zoölogist. He was educated at Eton and at Trinity College, Cambridge, where in various capacities he spent more than three quarters of a century. As superintendent of the museum of zoölogy for 25 years he did much to promote the study of natural sciences at Cambridge. He became registrar of the university in 1891. Besides his papers on the anatomy and habits of the narwhal, and on the dolphins and on the extinct rhytina his publications include: *Old Friends at Cambridge and Elsewhere* (1900); *The Care of Books* (1901; 3d ed., 1909); *Cambridge, a Concise Guide of the Town and University* (1902; 3d ed., 1906); *Endowments of the University of Cambridge* (1904).

CLARK, JONAS GILMAN (1815–1900). An American philanthropist, born at Hubbardston, Mass. After a term of service as a carriage maker's apprentice, he began the manufacture of tinware, with shops at Milford and Lowell. In 1853 he went to California, where he developed a successful business. He invested largely in real estate, and subsequently added to his fortune by banking operations in the East. About 1880 he removed from New York City to Worcester, Mass. There, in 1887, he obtained a charter for an institution of higher education, and in 1889 founded Clark University for postgraduate study such as could not well be carried on up to that time in the United States. He provided an endowment fund of $1,000,000, and by the terms of his will secured to the university a further endowment of $2,500,000. (See CLARK UNIVERSITY.) He also established an endowed public library at Hubbardston.

CLARK, KATE UPSON (1851–). An American author, born at Camden, Ala. She graduated from Wheaton Seminary in 1869 and from the Westfield (Mass.) Normal School three years later. In 1874 she was married to Edward Perkins Clark, who died in 1903. For several years she taught school in Cleveland, Ohio, in 1882–87 was editor of *Good Cheer*, at the same time conducting a department in the Philadelphia *Press*, and from 1892 to 1895 edited *Romance*. In 1907 she became an editorial writer on the *Brooklyn Eagle*, also acting as literary editor of the *Christian Herald*, and contributing to many magazines and religious weeklies. She also became known as a lecturer on literary, educational, and domestic topics. Her writings in book form include: *Bringing Up Boys* (1900); *White Butterflies* (1900); *Move Upward* (1902); *The Dole Twins* (1906); *The Adventures of Spotty* (1907); *Art and Citizenship* (1907).

CLARK (JOSIAH), LATIMER (1822–98). An English electrician and engineer, born at Great Marlow, brother of Edwin Clark (1814–94), an engineer, with whom he was associated. He invented the gutta-percha coating for inclosing underground wires, the "double-cap invert" insulator and the "Clark cell," and made valuable investigations concerning the action of electric currents in submarine cables. He also invented a submarine cable covering of asphalt, hemp, and silica, and had a part in laying many submarine cables, including the first in the South Atlantic Ocean between Pernambuco and St. Louis, Senegal. He was interested in other forms of engineering as well, including the construction of pneumatic tubes, canals, and floating docks. In 1861–68 he was a partner of Sir Charles Tilston Bright (q.v.). He published *An Elementary Treatise on Electrical Measurement* (1868); *Electrical Tables and Formulæ* (1871); *Dictionary of Metric and Other Useful Measures* (1891), and a *Memoir of Sir W. F. Cooke* (1895).

CLARK, LEWIS GAYLORD (1810–73). An American editor, born in Otisco, N. Y. For 25 years (1834–59) he edited, in New York City, the *Knickerbocker Magazine*, which, by contributions from such writers as Irving, Bryant, Willis, and Longfellow, and by his own departments, the "Editor's Table" and "Gossip with Readers and Correspondents," he made the leading American literary publication of the time. Pecuniary distress caused its discontinuance in 1859, and Clark removed to Piermont, N. Y., where he lived in a residence presented by former contributors to his magazine, who raised the necessary funds in part by publishing a volume of their contributions, under the title *The Knickerbocker Gallery*. He held a place for some time in the New York Customhouse, but still contributed regularly to most of the leading periodicals. His work was marked by a pleasant humor. He published the *Knickerbocker Sketch-Book* (1850), including some of his own essays, *Knick-Knacks from an Editor's Table* (1852).

CLARK, THOMAS MARCH (1812–1903). An American Episcopal prelate. He was born at Newburyport, Mass.; graduated at Yale in 1831; studied theology at Princeton, and was licensed to preach as a Presbyterian in 1835. He became an Episcopalian in the following year, and was rector of Grace Church, Boston, for seven years, afterward holding charges in Philadelphia, Hartford, and Providence. In 1854 he was consecrated Bishop of Rhode Island, and in 1899, on the death of Bishop Williams, of Connecticut, became presiding Bishop of the Episcopal church in America. His *Reminiscences* appeared in 1895; among his other works are *Early Discipline and Culture* (1852), and *Primary Truths of Religion* (1869).

CLARK, VICTOR SELDEN (1868–). An American economist, born at Portageville, N. Y. He was educated at the universities of Minnesota and Chicago, and at Göttingen, Bern, and Columbia. After serving as principal and superintendent of schools in Minnesota (1893–97), he became superintendent of public instruction and President of the Insular Board of Education of Porto Rico under the military government. From 1902 to 1909 he investigated labor conditions in foreign countries and insular possessions for the United States. In 1910 he had charge of the census of Hawaii and in the same year he was appointed commissioner of immigration, labor, and statistics for that territory. His publications include: *Movement in Australasia* (1906);

Women and Children Wage Earners in Great Britain (1908); *The Canadian Industrial Disputes Act of 1907* (1909), and also bulletins of the Bureau of Labor on the labor conditions in Cuba, Hawaii, New Zealand, the Philippines, Java, and Mexico.

CLARK, WALTER ELI (1869–). An American public official, born at Ashford, Conn., and educated at the Connecticut Normal School, Williston Seminary, and Wesleyan University. He was for many years engaged in journalistic work, chiefly as Washington correspondent for several important newspapers. In 1907 he was appointed Governor of Alaska by President Taft, and this office he held until 1913. Previous to his appointment as Governor, he had been engaged in gold mining in Alaska. He contributed articles to magazines and weekly periodicals.

CLARK, WILLIAM (1770–1838). An American soldier and explorer, brother of George Rogers Clark (q.v.), and the associate of Meriwether Lewis on the famous Lewis and Clark expedition (q.v.). He was born near Charlottesville, Va.; removed with his family to the site of Louisville, Ky., in 1784; entered the army in 1791; and served as a lieutenant of infantry, under General Wayne, against the Indians, in 1794. He resigned, owing to ill health, in 1796; but in 1803 was recommissioned as a second lieutenant, and from 1804 to 1806 shared with his friend Meriwether Lewis the command of an exploring party which, leaving St. Louis in May, 1804, crossed the continent, reaching the mouth of the Columbia River in November, 1805, and arrived at St. Louis on its return in September, 1806. He was commissioned brigadier general of militia in 1807, served as Indian agent for the Territory of Upper Louisiana, was Governor of Missouri Territory from 1813 to 1821, and acted as Superintendent of Indian Affairs at St. Louis from 1822 until his death. In 1828 he laid out Paducah, Ky., and in 1830 negotiated the Treaty of Prairie du Chien. Consult the biographical sketch by Coues in vol. i of his *History of the Expedition Under the Command of Lewis and Clark* (New York, 1893), and the other authorities referred to under LEWIS AND CLARK EXPEDITION, THE.

CLARK, WILLIAM ANDREWS (1839–). An American capitalist and politician, born near Connellsville, Pa. He settled in Iowa in 1856, studied law at Mount Pleasant (Iowa) University, but never practiced; drove an ox team from Colorado to Montana in 1863, and by manufacturing, mercantile pursuits, mining, and banking, acquired a large fortune. It is said that he became the largest owner of copper mines in the world. In 1884 and 1889 he was president of the Montana Constitutional Convention. He was Democratic nominee for United States Senator in 1890, but although he claimed the election, did not secure a seat. In 1889 he was elected by the State Legislature to succeed Lee Mantle as United States Senator. Thereupon, at the instance of Marcus Daly, the Anaconda mine owner, and his political rival, there was begun, before the Senate Committee on Elections and Privileges, an investigation which resulted in the recommendation by the committee that the Senate adopt a resolution to the effect that Clark "was not duly and legally elected to a seat in the Senate." Clark, in an address to the Senate, reviewed the report of the committee, and resigned. Almost immediately thereafter he was appointed by the acting Governor of Montana to fill the vacancy caused by his resignation. This appointment was subsequently declared by the Governor to be invalid. Clark was elected to the United States Senate by the Montana Legislature for the term 1901–07. In 1900–05 he built in New York City, at Fifth Avenue and 77th Street, an elaborate house—one of the show places of the city—and there housed a magnificent collection of art masterpieces.

CLARK, WILLIAM BULLOCK (1860–). An American geologist, born at Brattleboro, Vt. He was educated at Amherst College, and studied geology at Munich. In 1887 he was made instructor in geology at Johns Hopkins University, and in 1888 became connected with the United States Geological Survey. In 1891 he was appointed director of the Maryland Weather Service; from 1892 to 1894 was associate professor of geology at Johns Hopkins University, and in the latter year was placed at the head of the geological laboratory. In 1896 he was made State geologist of Maryland, in 1900 was appointed commissioner for the State of Maryland on the resurvey of Mason and Dixon's line, and in 1908 was made a member of the Maryland State Conservation Commission. His publications include a number of interesting papers and reports dealing with subjects of American geology, contributed more especially to the volumes of the Maryland Geological Survey.

CLARK, WILLIAM GEORGE (1821–78). An English scholar, born in 1821. He passed his boyhood in Yorkshire and in 1844 was graduated from Trinity College, Cambridge, with great distinction, being elected fellow of his college. He was subsequently elected a tutor, and then public orator of the university (1857). In 1849 he visited Spain, and in 1856 he made a tour of Greece. Sketches of these travels were published under the titles *Gazpacho* (1850) and *Peloponnesus* (1858). In 1853 he took orders, but in 1869 he asked his Bishop to be relieved, stating his reasons for the step in a pamphlet entitled *The Present Dangers of the Church of England* (1870). He edited the first series of *Cambridge Essays* (1855); contributed to *Fraser's Magazine;* and was one of the founders of the *Journal of Philology* (1868), of which he was an editor; but he is chiefly known for the *Cambridge Shakespeare* (9 vols., 1863–66), in which, though it was planned by himself, he was aided by W. A. Wright (q.v.). It furnishes one of the best texts yet published. The two editors also prepared the *Globe Shakespeare* (1864) and single plays for students. Owing to ill health, Clark retired from Cambridge in 1873 and passed his last years at York, where he died, Nov. 6, 1878. In 1883 the Clark Lectureship in English Literature was founded, at Trinity, from property left by him to the college.

CLARK, WILLIAM THOMAS (1831–1905). An American soldier, born in Norwalk, Conn. At the beginning of the Civil War he became a lieutenant and adjutant of an Iowa regiment. He rose to the rank of brigadier general of volunteers (1865), and was made a major general at the close of the same year for gallant and meritorious services during the war. He was chief of staff of General Grant's Army of the Tennessee. After the war he made his home in Galveston, Tex., where he organized the first

negro school and befriended negroes at the risk of his life; founded the First National Bank and was its first cashier, and also served as postmaster. He was a Republican. As a representative from Texas in Congress in 1869–72, he obtained the first appropriation for the harbor of Galveston ($100,000), making possible the completion of the jetties there.

CLARK, Willis Gaylord (1810–41). An American poet, born at Otisco, N. Y. He became proprietor and editor of the *Philadelphia Gazette,* and was long a contributor to the *Knickerbocker Magazine,* edited by his twin brother, Lewis Gaylord Clark (q.v.), by whom were prepared his *Literary Remains* (1844), with a memoir, and a complete edition of his poems (1847). The former of these was made up chiefly of the *Ollapodiana Papers,* a series of prose sketches that had first appeared in the *Knickerbocker.* His poetry is contemplative and serious, his prose marked by humorous fancy, and both have the facility of the group to which he belonged.

CLARK COLLEGE. An institution for higher education, founded in 1902 at Worcester, Mass. The college was endowed by Jonas G. Clark with $1,300,000, and was granted equal rights in the already existing campaign and buildings of its sister institution, Clark University (q.v.). Clark College is legally "the collegiate department of Clark University," but owing to peculiarities in the will of the founder, it is a completely independent organization of a separate endowment, and is autonomous in all its activities. The students in 1913 numbered 161, and the instructors, not counting assistants, 24. All students, though pursuing a variety of groups of study, are candidates for the degree of A.B. The library of the college contains upward of 65,000 volumes, of which about 10,000 are specifically set apart for college use in a special college library. The productive funds amount to about $1,500,000, and the net income from all sources to about $73,000. The president is Edmund C. Sandford.

CLARKE, Adam (c.1762–1832). A British Methodist clergyman and biblical scholar, born in County Londonderry, Ireland. He studied at John Wesley's School, at Kingswood, near Bristol; adopted the career of a Methodist preacher; was sent out by Wesley, in 1782, and was president of the conferences of 1806, 1814, and 1822. He was a thorough student of the classics, natural science, Church history and Oriental languages and literature, and published works in all of these branches. He assisted in the preparation of the Bible Society's Arabic Bible and wrote: *A Bibliographical Dictionary* (6 vols., 1803–04); *Memoirs of the Wesley Family* (1823); and, most important of all, *Commentary on the Bible* (8 vols., 1810–26). He was engaged in editing Rymer's *Fœdera,* from 1808 to 1818, when exhaustion compelled him to give up the task. For his *Life,* consult Etheridge (London, 1858).

CLARKE, Alexander Ross (1828–1914). An English geodesist and astronomer. He was commissioned second lieutenant in the Corps of Royal Engineers in 1847 and was transferred to the Ordnance Survey in 1850, retiring in 1881 with the rank of lieutenant colonel. The results of his first investigation on the figure of the earth were published in 1858 and those of his second investigation in 1866. Colonel Clarke was a delegate to the International Geodetic Congress in Rome in 1883. In 1887 he was awarded the Royal medal of the Royal Society, of which he was a fellow. He published, besides the above-mentioned reports: *Comparisons of the Standards of Length of England, France, Belgium, Prussia, Russia, India, Australia* (1866); *Determination of the Position of Feaghmain and Haverfordwest* (1867); *Comparisons of Standards and Lengths of Cubits* (1873); *Geodesy* (1880), which was translated into several foreign languages.

CLARKE, Benjamin Franklin (1831–1908). An American engineer and educator, born at Newport, Maine. He graduated in 1863 at Brown University, and afterward became connected with the university as instructor (1863–68), professor of mathematics (1868–93), professor of mechanical engineering (from 1893), and acting president (1896–97 and 1898–99). In 1884 he published a biography and eulogy of Prof. Samuel S. Greene.

CLARKE, Sir Caspar Purdon (1846–1911). A British American art connoisseur. He was born at Richmond, County Dublin, Ireland. In 1862 he entered the National Art Training School at South Kensington, London. He assisted in the construction of the Houses of Parliament and the South Kensington Museum in 1865 and 1867. In 1879 he was appointed architect to the English Legation in Persia. In 1880 Clarke was appointed to direct the reorganization of the Eastern collections in the South Kensington Museum. He was made director of the Museum in 1896, and was knighted in 1902. In 1905 he was appointed director of the Metropolitan Museum in New York, in which capacity he served until failing health caused his retirement in 1910. Under his administration the Museum was reorganized and many acquisitions were made, especially in the decorative arts. He published many papers on architectural subjects. He was a fellow of the Royal Institute of British Architects, and a member of many important societies.

CLARKE, Charles Cowden (1787–1877). An English author and lecturer, born in Enfield, Middlesex. He was an intimate friend of Shelley, Keats (whose schoolmaster was Clarke's father), Leigh Hunt, and Lamb. He was a music publisher. With his wife, Mary Cowden Clarke (q.v.), he annotated an edition of Shakespeare (1869), and compiled *The Shakespeare Key* (1879). His brilliant lectures on Shakespeare and other poets, delivered in London (1834–54), did much to arouse a wider interest in the higher drama. He published: *Tales from Chaucer* (1833); *Shakespeare Characters* (1863); *Molière Characters* (1865); *Recollections of Writers* (1878); and periodical articles on the drama and fine arts. Consult the *Biography,* by his wife (London, 1887).

CLARKE, Edward Daniel (1769–1822). An English traveler and mineralogist. He was born at Willingdon, in Sussex; graduated at Cambridge in 1790; and then traveled, as tutor to different young men, through the greater part of Europe, Egypt, and Asia Minor, remaining away from England most of the time until 1802. In 1807 he began a course of lectures on mineralogy at Cambridge, and the university established a professorship of that science for him, and made him University librarian in 1817. He presented to the library a number of valuable marbles; among others, the colossal statue called the Eleusinian Ceres, but really a Cistophorus, discovered by Wheler in 1676, and now in the

Fitzwilliam Museum. His *Travels* (6 vols., 1810–23) were received with extraordinary favor. Besides numerous publications bearing on mineralogy, he also wrote *Greek Marbles Brought from the Shores of the Euxine, Archipelago, and Mediterranean* (1809), and *The Tomb of Alexander* (1805). His collection of minerals was purchased by Cambridge, and his MSS. by Oxford University. For his *Life*, consult Otter (London, 1825).

CLARKE, Sir Edward George (1841–). A British lawyer and public official, born in London. He was educated at the College House of Edmonton, at the City of London College, and in King's College evening classes. He was called to the bar in 1864, and won a great name through his brilliant handling as counsel of the Penge and Detective cases (1877), the Bartlett Case (1886), the Baccarat Case (1891), and the Jameson Case (1896). In 1886–92 he was solicitor-general under the Conservative administration. He was a member of Parliament for Southwark (1880), for Plymouth (1880–1900), and for the City of London (1906). His publications include: *Treatise on the Law of Extradition* (1866; 4th ed., 1903); *Easy Shorthand* (1907); *Selected Speeches* (1908); *Swifthand* (1909); *The Epistles of St. Paul* (1912).

CLARKE, Frances Elizabeth. See Grand, Sarah.

CLARKE, Frank Wigglesworth (1847–). An American chemist, born in Boston and educated at the Lawrence Scientific School, Harvard University. He was an instructor at Cornell University in 1869, professor of chemistry at Howard University in 1873–74, and professor of chemistry and physics at the University of Cincinnati from then until 1883, when he was appointed chief chemist of the United States Geological Survey and honorary curator of minerals in the National Museum. In 1900 he was a member of the Paris Exposition international jury of awards; in 1901 he was president of the American Chemical Society; and his distinction was recognized in various other ways. He is joint author with Louis M. Dennis of *Elementary Chemistry* (1902) and *Laboratory Manual of Elementary Chemistry* (1902), and author of *The Constants of Nature* (5 vols., 1873–82; vol. v, "A Recalculation of the Atomic Weights," 3d ed., 1910), and of various bulletins of the Geological Survey and many papers.

CLARKE, Sir George Sydenham (1848–). An English soldier and military writer, born in Lincolnshire. He was educated at the Royal Military College at Woolwich, and from 1871 to 1880 was on the staff of the Royal Engineering College, Cooper's Hill. He saw active service in the Egyptian expedition of 1882 and in the Sudan in 1885, was in the War Office until 1892, then on special duty abroad, and in 1894–1901 superintendent of the royal carriage factory. From 1901 to 1904 he served as Governor of Victoria, Australia, and in 1907 as Governor of Bombay. He was made Knight Commander of St. Michael and St. George in 1893. His principal writings are: *Fortification, Past, Present, and Future* (1890); *The Navy and the Nation* (1897); *Imperial Defense* (1897); *Russia's Sea-Power, Past and Present* (1898).

CLARKE, Helen Archibald. An American editor and critic, born in Philadelphia. She graduated, in 1884, at the music department of the University of Pennsylvania; in 1889, with Charlotte Porter founded *Poet-Lore*, a quarterly magazine of letters. With Miss Porter also she edited, notably, *Robert Browning's Complete Poetical Works*, 12 vols. (1898); *Mrs. Browning's Complete Works*, 6 vols. (1900); and *The First Folio Edition of Shakespeare*, 40 vols. (1903). Among books of her own writing are *Browning's Italy* (1907); *Browning's England* (1908); *Longfellow's Country* (1909); *Hawthorne's Country* (1910); *Poet's New England* (1911); *Browning and his Century* (1913).

CLARKE, Henri Jacques Guillaume, Comte d'Hunebourg and Duc de Feltre (1765–1818). A French general, born at Landrecies (Nord). He studied at the Ecole Militaire, Paris, entered the cavalry, and having become lieutenant colonel, so distinguished himself at Landau as to be promoted to be brigadier general. In 1793 he was deprived of his command, as a suspect, but in 1795 was reinstated in the service as a general of division, and made by Carnot chief of the topographical bureau of the War Ministry. Sent by the Directory to Italy to observe the movements of Napoleon, then commanding the French army there, he entered into the spirit of that general's plans, and was later rewarded by being appointed his private secretary. In 1805 he was Governor of Vienna, in 1806 of Berlin, and in 1807–13 Minister of War. Upon the entry of the allies into Paris, he declared himself a Royalist; during the Hundred Days accompanied Louis XVIII into exile to Ghent, and from 1815 to 1817 was again Minister of War.

CLARKE, Jacob Augustus Lockhart (1817–80). An English physician, born in London. He was brought up in France, but studied medicine in England, at Guy's and St. Thomas's hospitals. He divided his attention between private medical practice and original research in microscopic anatomy and pathology, giving most of his time to research. A group of ganglion cells in the spinal column was named after him, "the posterior vesicular column of Clarke." The results of his investigations were published in the form of special papers, a list of which is in the *Catalogue of the Library of the Medico-Chirurgical Society* (1879).

CLARKE, James Freeman (1810–88). An American Unitarian clergyman. He was born in Hanover, N. H., and graduated at Harvard in 1829, and at the Cambridge Divinity School in 1833. He was pastor of a Unitarian church in Louisville, Ky., until 1839. In 1841 he assisted in founding the Church of the Disciples, Boston, of which he was pastor from 1841 to 1850, and from 1854 until his death. He was a friend of Emerson and Channing—with whom he edited the *Memoirs of Margaret Fuller Ossoli* (1869), and wrote for the *Dial*—a supporter of the antislavery movement, and secretary of the American Unitarian Association in 1859–62. He was one of the overseers of Harvard, where he was professor of natural religion and Christian doctrine (1867–71), and lectured on ethnic religions (1876–77). Besides a vast number of articles contributed to current journals and magazines—many collected in *Nineteenth Century Questions* (1898)—Dr. Clarke published many works, including: *Theodore* (1841), a translation from the German of De Wette; *Campaign of 1812* (1848); *Eleven Weeks in Europe* (1852); *Christian Doctrine of Prayer* (1854, new ed., 1874); *The Hour Which Cometh and Now Is*, a volume of sermons (1864, 3d ed.

1877); *Orthodoxy: Its Truths and Errors* (1866; reprinted often); *Steps of Belief* (1870); *The Ten Great Religions* (2 vols., 1871–83; vol. i, 22d ed. 1886; vol. ii, 5th ed. 1886); *Common Sense in Religion* (1874); *Essentials and Non-Essentials in Religion* (1878); *The Legend of Thomas Didymus, the Jewish Skeptic* (1881); *Manual of Unitarian Belief* (1884); *Anti-Slavery Days* (1884); *Vexed Questions* (1886); and *Sermons on the Lord's Prayer* (1888). Consult E. E. Hale's edition of Clarke's *Autobiography, Diary, and Correspondence* (Boston, 1891).

CLARKE, JAMES P. (1854–1916). An American public official and legislator, born at Yazoo City, Miss. After graduating from the University of Virginia he was admitted to the bar in 1878, and in the following year he moved to Helena, Ark. He was a member of the Arkansas House of Representatives in 1886–87, and of the Arkansas Senate in 1888–92, and was President of the latter in 1891. In 1893–94 he was Attorney-General of Arkansas, during the following two years was Governor of the State, and after serving as United States Senator in 1903–09 was reëlected to that office for the term 1909–15. In 1913 he was elected President pro tem of the Senate.

CLARKE, JOHN (1609–76). An English physician, one of the founders of Rhode Island, in America. He emigrated to Boston in 1637; as one of the friends of Anne Hutchinson there, he was driven out of the Colony. Roger Williams received him, and Clarke became one of the settlers of Aquidneck, R. I. He founded at Newport, probably in 1640, a Baptist church, which, next to the one founded by Roger Williams at Providence in 1636, was the earliest in America. In 1651 he was arrested, fined, and imprisoned for holding a Baptist meeting in Lynn, Mass. In the same year he went with Williams to England, as an agent for the Colony, and there published *Ill News from New England; or, a Narrative of New England Persecution* (1652). After remaining for 12 years in England, he obtained from Charles II a second charter for Rhode Island, which secured the right of personal liberty in matters of religion. On his return he resumed the care of the Newport church, and kept the pulpit until his death. He was a member of the General Assembly from 1664 to 1669; was Deputy Governor in 1669 and 1671, and afterward codified the Rhode Island laws. He has been called "the Father of American Baptists." Consult Richman, *Rhode Island* (New York, 2 vols., 1902).

CLARKE, JOHN MASON (1857–). An American geologist and paleontologist, born at Canandaigua, N. Y. He studied at Amherst and the University of Göttingen, and in 1881–84 was professor of geology and mineralogy at Smith College. In 1885 and 1886 he was lecturer on geology at the Massachusetts State Agricultural College, in Amherst. In 1894 he was appointed professor of geology in the Rensselaer Polytechnic Institute at Troy, and in 1898 State paleontologist of New York, becoming State geologist and director of the Museum in 1904. His publications include: *New Devonian Crustacea* (1882); *Cirriped Crustacea from the Devonian* (1883); *Ueber deutsche oberdevonische Crustaceen* (1884); *On Devonian Spores* (1885); *On the Higher Devonian Faunas of Ontario County, New York* (1886); *Early Devonic History of New York and Eastern North America* (1908); *The Eurypterida of New York,* by Clarke and Ruedemann (1912); and *The Heart of Gaspé: Sketches in the Gulf of St. Lawrence* (1913).

CLARKE, JOHN SLEEPER (1833–99). An American comedian, after 1867 a resident of England. He was born at Baltimore, and in his boyhood was a schoolmate of Edwin Booth, with whom he engaged in amateur dramatic readings. Giving up the study of law in order to go upon the stage, he made his first professional appearance in Boston, as Frank Hardy in *Paul Pry,* at the Howard Athenæum, in 1851. The next year he went to Philadelphia. In 1859 he married Asia Booth, the sister of his old schoolmate. He made his appearance in New York, in 1861, as Diggory in *The Spectre Bridegroom.* From 1864 to 1867 he was associated with Booth in the management of the Winter Garden, New York; they also had theatres in Philadelphia and Boston. Clarke's popularity was very great, among his favorite parts being Dromio of Syracuse, Paul Pry, Bob Brierly in the *Ticket-of-Leave Man,* and especially Major Wellington de Boots in *Everybody's Friend,* and Toodles. Having gone to London in 1867, he made his English début in the rôle of Major de Boots. His success was such that he decided to remain in England, though he afterward made several visits to the United States (1870, 1871, 1879, and 1884), where he was warmly welcomed. Some of his later parts were Salem Scudder in *The Octoroon,* Dr. Pangloss in *The Heir at Law,* Ollapod in *The Poor Gentleman,* Babbington Jones in *Among the Breakers,* and Bob Acres in *The Rivals;* but Toodles remained the favorite. Its first run at the Strand Theatre, where Clarke was long engaged, was for 200 nights. He managed several London theatres, including the Haymarket, which the Bancrofts took after he gave it up. In 1889 he retired and spent the last 10 years of his life in leisure, near London. Consult Bell, in Matthews and Hutton, *Actors and Actresses of Great Britain and the United States,* vol. ii (New York, 1886), and Clapp and Edgett, *Players of the Present* (New York, 1899).

CLARKE, MACDONALD (1798–1842). An American writer, known as "The Mad Poet." He was a native of Bath, Me., but was for many years a conspicuous figure in New York City, where he married an actress and wrote with much freedom and little taste of the belles of the city. In spite of his conceit and eccentricities he endeared himself to his contemporaries, notably Fitz-Greene Halleck, who made him the hero of a poem, "Discarded." He considered himself the greatest poet of America, and, besides a mass of trash, wrote some things that are tender and lovable. Among his conceits the best known is "Now Twilight lets her curtain down, And pins it with a star." Among his publications, most of which are now rare, are: *A Review of the Eve of Eternity* (1820); *The Elixir of Moonshine, by the Mad Poet* (1822); *Afara, or, The Belles of Broadway* (1833); *Death in Disguise*—a temperance poem (1833); *A Cross and a Coronet* (1841).

CLARKE, MARCUS. See AUSTRALIAN LITERATURE.

CLARKE, MARY VICTORIA COWDEN (NOVELLO) (1809–98). An English Shakespearean scholar and author. She was the pupil and associate of Mary Lamb. At the age of 19

she was married to Charles Cowden Clark (q.v.), her brother's partner in the music publishing business, and soon afterward began the great work of her life, the *Concordance to Shakespeare*, which was published in London in 1845. She wrote: *The Girlhood of Shakespeare's Heroines* (1850); *The Iron Cousin* (1854); *World-Noted Women* (1850); *My Long Life: An Autobiography* (1896); and *Letters to an Enthusiast: Being a Series of Letters addressed to Robert Balmanno, Esq., of New York, 1850–61*, edited by A. U. Nettleton (Chicago, 1902).

CLARKE, REBECCA SOPHIA (1833–1906). An American author, born at Norridgewock, Me. Under the pseudonym of "Sophie May," she published such juvenile books as the *Little Prudy Stories* (6 vols., 1864–65); *Dotty Dimple Stories* (6 vols., 1867–69); and one or two novels.

CLARKE, SAMUEL (1675–1729). An English clergyman, born at Norwich and educated at Caius College, Cambridge. He was a disciple of Newton, and attempted to modify the theories of Descartes. In 1698 he became chaplain to Bishop Moore, of Norwich, and undertook the study of divinity, publishing in 1699 *Three Practical Essays on Baptism, Confirmation, and Repentance.* In 1704–05 Clarke delivered the Boyle lectures, out of which was developed his *Demonstration of the Being and Attributes of God*, and after the death of Locke, in 1704, he was considered as the leading English metaphysician. Queen Anne made him one of her chaplains and presented him to the rectory of St. James, Westminster. In 1708 he published *A Discourse Concerning the Unalterable Obligations of Natural Religion and the Truth and Certainty of Christian Revelation*, and in 1712 *The Scripture Doctrine of the Trinity*, in which his denial of the belief of the primitive Church in the Trinity brought upon him the attacks of theologians. In 1714 the Lower House of Convocation complained of his teachings and sent the matter to the Upper House. Clarke evaded the difficulty, and promised to be silent on the subject of the Trinity. His views were considered to be semi-Arian (see ARIUS), and involved him not only with the authorities of the Established church, but with the free-thinkers of his time. In 1715 appeared his *Philosophical Inquiry Concerning Human Liberty.* The Princess of Wales, afterward Queen Caroline, requested him to discuss with Leibnitz the questions of time and space and their relations to God. The correspondence to which this gave rise is to be found in the collection of papers which passed between Clarke and Leibnitz (1717). His works include an edition of Cæsar (1712); Homer's *Iliad*, in Greek and Latin (1729); and *An Exposition of the Church Catechism* (1729). His most important work was done in the sphere of ethics, where he maintained that morality is "incumbent on men, from the very nature and reason of things themselves." "The fitness of things" requires that every object be treated according to its own nature, and therefore that man be treated by man with due respect to his freedom of choice. The laws of morality are as reasonable as those of mathematics, and are independent of the consequences of moral acts; but God has so constituted the world that morality is finally rewarded. He was thus an ethical rationalist. See his *Life*, by his friend Hoadly, prefixed to his collected works, published in 1738; and consult L. Stephen, *History of English Thought in the Eighteenth Century* (London, 1876).

CLARKE, SAMUEL FESSENDEN (1851–). An American naturalist, born at Geneva, Ill. He graduated from the Sheffield Scientific School (Yale) in 1878 and received his doctor's degree from Johns Hopkins University in 1879. He served as assistant to the United States Fish Commission (1874–75), was a fellow at Johns Hopkins (1879–81), lectured at Smith College, and in 1881 became professor of natural history at Williams College. He was elected a fellow of the American Association for the Advancement of Science and of the American Academy of Arts and Sciences, and was president of the American Society of Naturalists in 1914.

CLARKE, THOMAS SHIELDS (1860–). An American sculptor and painter. He was born in Pittsburgh and studied at the Art Students' League, New York, and under Lefebvre and Dagnan-Bouveret in Paris. Among his paintings "A Fool's Fool" (1887, Pennsylvania Academy), and "A Night at Morocco" (Philadelphia Art Club), which received a medal at Berlin in 1891, deserve special mention. He later studied modeling under Chapu, and thereafter devoted himself almost entirely to sculpture. His fountain the "Cider Press" (1893), in Golden Gate Park, San Francisco, is vigorously handled but lacking in decorative conception. Better examples of his work are the caryatids of the "Four Seasons" on the Appellate Court building, New York, and "Alma Mater" on the campus at Princeton University, which are decorative as well as graceful and dignified. He was elected an associate of the National Academy of Design and received several medals.

CLARKE, WILLIAM EAGLE (1853–). An English naturalist, born at Leeds. He was educated at Yorkshire College. In 1884 he became curator of the Leeds Museum, four years later an assistant in the Edinburgh Museum, and in 1906 keeper of the natural history department of the Royal Scottish Museum, Edinburgh. He was for a time acting editor of the *Annals of Scottish Natural History* and the *Naturalist*, and became joint editor of the *Scottish Naturalist.* His publications include *Handbook of Yorkshire Vertebrata* (1881) and *Studies in Bird Migration*, 2 vols. (1912).

CLARKE, WILLIAM HORATIO (1840–1913). An American organist and musical author. He was born at Newton, Mass.; held positions as organist at Norwood, Dedham, Boston, and Woburn, and subsequently removed to Dayton, Ohio, where he was appointed superintendent of public schools. From 1878 to 1887 he was organist at the Tremont Temple, Boston. After his retirement, he became established at Reading, Mass. Clarigold Hall, a well-known chapel of music in that town, with its excellent four-manual organ, was built by him. His *New Method for Reed Organs* is justly celebrated, and he also published, besides collections of anthems and voluntaries, *Short Service Preludes* (1903); *Valuable Organ Information* (1904); *Artistic Information for Reed Organs* (1905); *How to Use Organ Stops and Pedals* (1908); *Standard Organ Building* (1909).

CLARKE, WILLIAM NEWTON (1841–1912). An American Baptist theologian. He was born at Cazenovia, N. Y., and graduated at what is now Colgate University in 1861, and from Hamilton Theological Seminary in 1863. After serving as a pastor, he was professor in Toronto Baptist

College from 1883 to 1887, and from 1890 to 1908, of Christian theology, from 1908 to his death, of ethics, in Colgate University, Hamilton, N. Y. He published: *Commentary on the Gospel of Mark* (1881); *The Circle of Theology: An Introduction to Theological Study* (1897); *Outline of Christian Theology* (1898); *What Shall We Think of Christianity?* (1899); *Can I Believe in God the Father?* (1899); *A Study of Christian Missions* (1900); *The Use of the Scriptures in Theology* (1905); *The Christian Doctrine of God* (New York, 1909); *Sixty Years with the Bible* (New York, 1909).

CLARKE, WILLIAM ROBINSON (1829–1912). A Canadian Anglican clergyman and educator. He was born at Inverurie, Scotland, and was educated at Aberdeen and at Hertford College, Oxford. He was ordained a priest in 1858, and after filling several minor appointments became prebendary of Wells in 1870. Coming to Canada in 1882, he was in the same year appointed professor of mental and moral philosophy in Trinity University. During the term of his professorship, from which he retired in 1908, he was widely known in Canada and the United States as a preacher, writer, and lecturer. In 1887 he was Baldwin lecturer, and in 1899 Slocum lecturer, at the University of Michigan. He was frequently a delegate to the provincial and general Anglican synods, and in 1895 a delegate to the Pan-American Congress of Religion and Education at Toronto. In 1891 he was elected a fellow of the Royal Society of Canada and in 1900 president of that institution. For some years he was editor of the *Canadian Churchman.* His principal publications were: *The Redeemer* (1863); *The Comforter* (1864); *The Four Temperaments* (1874); *Witnesses to Christ* (Baldwin lectures, 1888); *Savonarola: His Life and Times* (1892); *The Anglican Reformation* (1896); *The Paraclete* (Slocum lectures, 1900); *Pascal and the Port Royalists* (1902). In 1886 he translated and edited Hefele's *History of the Councils,* and later, Hagenbach's *History of Christian Doctrine.*

CLARK FORK. One of the most important forks of the Columbia River, formed by the junction of the Flathead and Missoula rivers, Montana (Map: Montana, A 2). It flows northwest, through Lake Pend Oreille, in Idaho, continuing in a northwest course thence across the northeast corner of Washington, and empties into the Columbia River (q.v.) on the Canadian frontier. It has a total length of about 650 miles, from the source of either tributary, and possesses abundant water power.

CLARKS'BURG. A city and the county seat of Harrison Co., W. Va., 82 miles by rail east of Parkersburg, on the Monongahela River, and on the Baltimore and Ohio and the Monongahela Traction Company railroads (Map: West Virginia, D 2). The city contains three hospitals and an Elks Home. It is in a country rich in coal, oil, and natural gas, has important shipping interests, and manufactures chemicals, fire brick, window glass, glass bottles, fruit jars, decorated tableware, iron and tin plate, enamelware, shaft pulleys, etc. It was the birthplace of Stonewall Jackson. Settled in 1772, Clarksburg was incorporated in 1849, and is governed at present under a charter of 1897, which provides for a mayor, elected annually, and a city council chosen by wards. The water works, including a large plant on the west fork of the Monongahela, are owned and operated by the municipality. Pop., 1890, 3008; 1900, 4050; 1910, 9201.

CLARKSDALE. A city and the county seat of Coahoma Co., Miss., 77 miles south of Memphis, Tenn., on the Yazoo and Mississippi Valley Railroad (Map: Mississippi, D 2). It contains a Carnegie library and an Elks Home. Clarksdale is situated in an alluvial delta, known for the richness of its soil, and carries on a trade in agricultural products and lumber. The water works and electric-light plant are owned by the city. Commission government has been adopted. Pop., 1890, 781; 1900, 1773; 1910, 4079.

CLARK'SON, MATTHEW (1758–1825). An American soldier and philanthropist, born in New York City. At the outbreak of the Revolutionary War he enlisted as a private, and in 1777 took part in the Saratoga campaign. He afterward served as aid-de-camp, with the rank of major, to Gen. Benedict Arnold (August, 1778–March, 1779) and to Gen. Benjamin Lincoln (1779 and 1781–July, 1782); was taken prisoner at Charleston on May 12, 1780, and in 1783 was brevetted lieutenant colonel. After the war he returned to New York, served several terms in the State Legislature, was president for many years of the bank of New York, was governor of the New York Hospital for 30 years, and did much for prison reform and the establishment of public schools. Consult *The Clarksons of New York* (New York, 1875–76).

CLARKSON, RALPH ELMER (1861–). An American portrait and figure painter. He was born at Amesbury, Mass., studied in the schools of the Boston Museum of Fine Arts, and from 1884 to 1887 under Lefebvre and Boulanger in the Académie Julian, Paris. After practicing portrait painting in New York, he again went abroad in 1892, remaining until 1896, when he took up his permanent residence in Chicago. He took a prominent part in the movement for municipal improvement, and was elected president of the Municipal Art Commission of Chicago; a member of the Chicago Society of Artists and of the Society of American Artists; was a member of the American Art Jury at the Paris Exposition in 1900, and of the International Jury of Awards at the St. Louis Exposition in 1904. He devotes himself chiefly to portraiture, but also exhibited figure subjects, characterized by refinement and tonal effects. Good examples are "Twilight Harmony" (Art Institute, Chicago) and "Studio Corner."

CLARKSON, THOMAS (1760–1846). An English philanthropist and antislavery agitator, born in Cambridge. He studied at Cambridge University, and early gave evidence of his antagonism to slavery in a Latin prize essay, which he wrote in 1785, on the question, "Is it right to make slaves of others against their will?" An English translation (1786) had an extensive circulation, and Clarkson resolved to devote his life to a crusade against African slavery. Associations were formed, and Clarkson, besides visiting the principal cities of England and going to Paris in the cause, published numerous essays, pamphlets, and reports on the subject. Wilberforce, whose coöperation he had secured, took the lead in the antislavery agitation, and in 1787 brought the subject before Parliament; but he afterward quarreled with Clarkson and claimed for himself priority in the antislavery movement. On March 25, 1807, the bill for the suppression of the slave trade became a law, and Clarkson, whose health had

failed in 1794, wrote *A History of the Rise, Progress, and Accomplishment of the Abolition of the African Slave Trade* (1808). At the Congress of Aix-la-Chapelle (1818) he presented an address to the Czar of Russia for concerted action by the Powers for the abolition of the slave trade; but nothing was accomplished at that time. On the formation of the Anti-slavery Society, in 1823, for the abolition of slavery in the West Indies, Clarkson became one of its leading members. His other works include: a valuable *Portraiture of Quakerism* (1806); *Memoirs of the Private and Public Life of William Penn* (1813); *Thoughts on the Necessity of Improving the Condition of the Slaves in the British Colonies* (1823). Consult: Taylor, *Biographical Sketch of Thomas Clarkson* (1839), and Elmes, *Thomas Clarkson* (1876).

CLARKS'VILLE. A city and the county seat of Montgomery Co., Tenn., 45 miles (direct) northwest of Nashville, near the junction of the Cumberland and Red rivers, and on the Louisville and Nashville and the Tennessee Central railroads (Map: Tennessee, C 1). It is the seat of the Southwestern Presbyterian University, founded in 1875, and of a Methodist seminary for young ladies, and has a public library. It is one of the great tobacco markets of the United States, and has manufactures of iron, agricultural implements, lumber, flour, snuff, etc., and valuable iron-ore deposits in the vicinity. Settled in 1780, Clarksville was incorporated some five years later, and is at present governed under a charter of 1850, revised in 1891. The mayor is elected every two years, and the city council controls all appointments to municipal offices. The city owns and operates its water works. Pop., 1890, 7924; 1900, 9431; 1910, 8548.

CLARKSVILLE. A city and the county seat of Red River Co., Tex., 61 miles west by north of Texarkana, on the Texas and Pacific Railroad (Map: Texas, E 3). The centre of a fertile agricultural region, it carries on a large trade in cotton, live stock, grain, and hides. The industrial establishments include a cotton compress, cottonseed-oil mill, etc. Pop., 1890, 1588; 1900, 2069; 1910, 2065.

CLARK UNIVERSITY. An institution of higher education, founded in 1887 at Worcester, Mass., by Jonas Gilman Clark. The university was originally planned to afford opportunity for full and free research along advanced lines; to add as materially as might be to the ascertained truths of science; to equip educators and specialists of the highest qualifications. It was especially stipulated that the best academic standards should forever be maintained, and as the original endowment was insufficient to equip courses in all subjects, but few courses were at first equipped, and those completely. These comprised postgraduate courses and the fundamental sciences of physics, chemistry, biology, psychology, and education. Only accredited college graduates are admitted as candidates for the Ph.D. degree, and students are thrown largely upon their own resources, the instructors acting as far as possible as "guides" and counselors. Ten scholarships and 20 fellowships have been established. Instruction is intrusted in some degree to the fellows and also to the docents (see DOCENTS), the latter representing the highest academic university appointments. Upon the death of Mr. Clark in 1900 the university received a bequest of additional funds for research—$600,000 for a library fund and $150,000 for a library building, $100,000 for an art department, and $1,300,000 for the establishment of an undergraduate department. (See CLARK COLLEGE.) In 1913 the number of students enrolled in the university was 90, while the faculty numbered 25. The productive funds amounted to about $2,400,000, and the income to about $96,000. The library contained 65,000 volumes. The university publishes several journals, including the *American Journal of Psychology*. Its president from its beginning has been Granville Stanley Hall (q.v.). Consult *Clark University 1889 to 1899* and the annual catalogues.

CLASSICAL PHILOLOGY. See GREEK LANGUAGE; ITALIC LANGUAGE.

CLAS'SICS (Lat. *classicus*, from *classis*, class, from *calare*, Gk. *καλεῖν*, *kalein*, to call). The term *classici* was originally applied to those citizens of Rome that belonged to the first and most influential of the six classes into which Servius Tullius divided the population. As early as the second century A.D. it is applied figuratively by Aulus Gellius, xix, 8, 15, to writers of the highest rank; this mode of designation has since been very generally adopted in both literature and art. Most nations style the best period of their literature the classical period, and its most distinguished writers their classics. But since the great productions of the writers and artists of antiquity have continued to be looked upon by moderns as models of perfection, the word "classic" has come to designate, in a narrower sense, the best writers of Greece and Rome, and "classical" to mean much the same as "ancient."

CLASSIFICATION. A term used in ore dressing to denote the separation of crushed ore into several products or sizes, the grains of which fall with the same maximum velocity. The coarser sizes in a product consist of light minerals or gangue rock and the finer sizes of heavy minerals. The values or minerals of a classified product are later separated from the gangue or barren rock by some method of sizing. Consult Richards, *Ore Dressing* (New York, 1903–09).

CLASSIFICATION OF ANIMALS. Classification is the act of sorting out and putting into groups kindred ideas, observations, or objects. As many classifications, then, are possible as are the categories which different persons may erect; for no two persons see things in the same light, nor have the same thoughts. Besides, there are many aspects that the one observer may take in viewing the same thing. Thus, we may classify plants and animals according to their anatomical structure, the method of their embryological development, their food or habitats. All classifications, then, are arbitrary; are the attempts of man to arrange, in an orderly fashion, his conceptions and observations. Classification in biology is, consequently, to be regarded as a subjective process. Nevertheless, the constant attempt of all modern naturalists is to conform, in the formation of their groups, as closely as possible to the facts of nature, and thereby express the natural kinship or blood relationship of animals, as learned through the investigation of their structure and phylogeny. A natural and true classification, then, is a statement of near or remote relationships, according to the degree of differentiation the forms sought to be classified have undergone in their descent from a more or less remote common ancestor. If a complete classification of animals is ever made, it will be a

complete genealogy of the animal kingdom. In this sense, classification is neither arbitrary nor artificial, but only tentative; and it will be permanent in so far as it conforms to the facts of kinship in descent. Hence, a nearer and nearer approach to a natural and real classification has been made with each forward step of knowledge in embryology, morphology, and paleontology.

"There is no question in natural history," said Louis Agassiz, in his classic *Essay on Classification*, "on which more diversified opinions are entertained than on that of classification—not that naturalists disagree as to the necessity of some sort of arrangement in describing animals or plants, for since nature has become the object of special studies, it has been the universal aim of all naturalists to arrange the objects of their investigations in the most natural order possible. Even Buffon, who began the publication of his great Natural History by denying the existence in nature of anything like a system, closed his work by grouping the birds according to certain general features exhibited in common by many of them. It is true, authors have differed in their estimation of the characters on which their different arrangements are founded; and it is equally true that they have not viewed their arrangements in the same light, some having plainly acknowledged the artificial character of their systems, while others have urged theirs as the true expression of the natural relations which exist between the objects themselves."

By collaboration and by common consent certain categories have been agreed upon, and these we generally have in mind when we speak of the classification of the animal or vegetable kingdom. These categories are founded mainly on anatomical and embryological relationships and differences; and in zoölogical classification, e.g., animals that resemble one another in structure, development, or both, are grouped closely together, or are more distantly associated, according to the nearness or remoteness of the kinship as evidenced by the facts of structure or development, whether in existing or in extinct forms. These grades or degrees of kinship we speak of as species, genera, families, orders, classes, etc. Species are more nearly related than genera, genera than families, etc.

The total number of the kinds of animals, or species, that are recognized is well over 500,000. We may roughly estimate 7000 mammals, 20,000 birds, 5500 reptiles, 2000 amphibians, 13,000 fishes, 60,000 mollusks, 360,000 insects, besides a host of the lower invertebrates. In order to think of all of these, it is necessary that they should be grouped into categories of larger size than species, and these, in turn, into still larger ones. This is rendered possible by the fact that animals show nearer and remoter affinities. The ordinary lowest category is *species;* but this may be subdivided into *races* or *subspecies;* several similar species are grouped into a *genus;* related genera constitute a *family;* several families may make up an *order.* Orders constitute a *class;* classes, a *phylum.* For example, see table below.

A particular species receives a composite name, embracing, first, that of the genus and, second, that of the species; thus, the common cat is *Felis domesticus.*

Scientific Nomenclature.—The custom, above stated, of giving to each animal a double name, that of its genus and its species, arose with Linnæus, and is called "binomial nomenclature." It answers to a man's family and individual or "Christian" name, as Smith, John. It always consists of Greek or Latin words, or of words put into Latinized form, partly because of a traditional custom descended from the early authors, who wrote only in Latin, but mainly because it is thus made comprehensible to readers in all languages. Furthermore, great confusion would follow the attempted use of vernacular names alone, since many different animals are given the same name in popular speech, while the same animal is known by various names in different localities. "Robin" means several very diverse birds to persons living in America, Great Britain, India, or Australia, but *Turdus migratorius* is unmistakably the American thrush, locally called the robin. Theoretically, these names are supposed to be suitably applied. Thus, *turdus* is the old Latin term for a thrushlike bird, and *migratorius* the Latin adjective "migratory." It often happens, however, through the misapprehension or ignorance of the person who first applies the name, that unsuitable or positively erroneous appellations have been given, or wrong collocations have been made. A subsequent student, discovering this error, or taking a different view of the animal's relationship, endeavors to correct it by giving it a new and, in his opinion, better name; or he may transfer it to another genus, but retain the specific name. A third writer, not knowing that the same animal has been previously described and named, may name it something entirely different. These changes and duplications went on almost unchecked until the middle of the nineteenth century, when the British Association for the Advancement of Science and other influential bodies of naturalists devised means of

INDIVIDUAL	Race, breed, or subspecies	Species	Genus	Family	Order	Class
House Cat	Manx Angora Tabby Tortoise-shell	*domesticus*	*Felis*	*Felidæ*	*Carnivora*	*Mammalia*
		lion tiger leopard	lynxes hunting cats	dogs hyenas bears	whales bats apes, etc.	

regulating the matter, which resulted in certain now generally accepted rules, the substance of which is as follows: A name for a new species is not recognized in science unless it is in the customary binomial form (the two parts agreeing in number and gender) and has been accompanied by a description by which the animal may be satisfactorily identified, and which is published in some book or periodical accessible to students in general; and when this has been done, no other person may give the animal a different *specific* name. This is called the rule of priority—that is, the first name legally applied must remain (as a mere label), whether it is subsequently found to have been well chosen or not. A limit, however, was found necessary to this rule, and it is therefore agreed that no name previous to the one made or sanctioned by Linnæus in the tenth edition of his *Systema Naturæ* (1758) shall be recognized. Certain minor limitations are also made for local needs —as, for example, with reference to Rafinesque in the United States. In zoölogical or botanical nomenclature, a generic name can be applied only to one group of organisms. If it is subsequently given to something else, the new application will not hold. According to one code, at least, a generic name that has disappeared by fusion of genera or the splitting of a genus cannot be used again. In scientific works, the technical name of an animal is often followed by the name (usually abbreviated) of the man who named it as a whole, as *Turdus migratorius*, Linn.; but if the generic name was made by one man and the specific by another, this is indicated by inclosing the name of the author of the specific name in parentheses, thus: Bluebird, *Sialia sialis* (Linn.). Latterly, the recognition of subdivisions within species, called subspecies, races, or varieties, has led to the addition of a third name in many cases, forming a trinomial; e.g., *Falco peregrinus anatum* means the (American) subspecies *anatum* of the European peregrine falcon, or our duck hawk. Another custom is that all specific and subspecific names shall begin with a small letter, even when "proper" adjectives or nouns. Similar rules and explanations apply to the names of the higher groups, which are capitalized, always in the plural, and, in the case of the family, take the termination *idæ*, which in zoölogy invariably indicates a group of family rank.

Categories of Classification. The number of known species of living animals is well over 500,000, to which must be added over 50,000 fossil-described species, making over 550,000 in all. To contain all these forms it is necessary to provide a complicated system of categories of varying ranks. We recognize the fact that, in beast as well as in man, no two individuals are exactly alike. But just as the various members of the B. Smith family more nearly resemble each other than they do the Jones or Brown families, so certain other animals, while showing slight individual differences, possess so many common, constant qualities that we put them in the same species. Likewise, several species have certain qualities in common, while they differ in other respects so markedly from all other species that we class them together in one genus. In the same way, a number of related genera fall naturally into the same family.

Species.—A term applied in biology to the unit of classification—that is, the lowest group that receives a name. (For the exceptional usage in respect to "subspecies," see below.) Although the term "species" is almost universally employed by biologists to-day, a precise definition cannot be applied to it; for there is absolutely no criterion by which a species may be distinguished from a variety, on the one hand, or a genus on the other. Whether a lot of organisms under consideration showing certain differences shall be considered two subspecies, two species, or two genera, depends upon the personal characteristics of the classifier. If he be conservative, and has studied extensively the systems of the past, he will draw his ideals from them, and call those groups "species" which show about that difference accorded to other related species by equally conservative classifiers in the past. If he be radical, he will disregard the ideals of his predecessors and, according to his personal bent, "lump" the diverse forms into one species, or possibly into one subspecies, or "split" them into distinct species. Indeed, a radical may take occasion to "revise" the grouping of a conservative in accordance with his peculiar ideals—in consequence of which, numbers of species may disappear by inclusion into old ones, or new ones may be added by division of old ones; or, finally, the grouping may be thoroughly reorganized or disarranged. At the present time naturalists have hit upon no method of avoiding this intolerable condition of affairs, which is rapidly bringing chaos into what was supposed to be a "system." A century ago, before so extensive collections had been made and studies were so critical, it was generally believed that "species" were perfectly distinct as well as immutable things. Even many of the scientific workers regarded the mythology of the first chapters of Genesis as a scientific record, and admitted that there were only so many "species" as were created in the beginning; that each species received its name from Adam, and that one pair of each (except parthenogenetic species) was preserved in the ark, to become the progenitors (or progenitor) of all the members of the species which have existed since. The worthlessness, for scientific purposes, of this literary account of the creation appears when we try to enumerate the "species" that were thus created. We then realize that "species" are not natural phenomena, but human devices of convenience, like the ward boundaries of a city. The boundary lines between species may, in some cases, be in part determined by natural phenomena, as ward boundaries may be limited by a stream or a bluff.

The history of the ideas entertained concerning species is an epitome of the most profound biological thought. In the development of any large idea, three stages may be recognized—first, the speculative suggestion of it; second, the clear statement of it as a working hypothesis; and, third, the demonstration. Such has been the history of the development of the modern idea of species as part of a continuous stream of life. The early Greeks were not troubled with the idea of species; they sought only a satisfactory speculative account of the origin of organisms. The early Christians interpreted the "Mosaic" account of the creation liberally, regarding the creation not so much as the forming of completed organisms as the forming of the *seed* out of which they were to arise. During the Middle Ages, however, and especially from the middle of the sixteenth to the middle of the nineteenth century, the doctrine of "special

creation" was universally taught by the Church. Milton's epics popularized the idea of creation ready made, with adult animals of the different species; and the rigid conceptions of species which the early botanists and zoölogists had invented seemed to support the teachings of the churchmen. With the founding of universities in the twelfth and thirteenth centuries, science began to awaken, and one of the first products of the Renaissance was the natural philosophers. Such men as Francis Bacon, Descartes, Leibnitz, and Spinoza did not limit their ideas to the teachings of the Church; they taught the necessary principle of continuity, to which the natural development of "species" was a necessary corollary. The more speculative naturalists, or philosopher naturalists, next applied the doctrine of continuity, as an hypothesis, to the facts of organisms. Such were Bonnet, who recognized that all life was continuous, and Oken, who conceived that all organisms have developed out of a primitive slime. Finally came the great naturalists, putting forth the idea of the mutation of species tentatively at first, then with greater vigor, until Darwin came, at the fullness of time, to precipitate the revolution. See EVOLUTION; DARWIN; LAMARCK.

The view that species are wholly arbitrary groups is not accepted by all naturalists. De Vries especially lays stress on the point that species are objective. Every species, he believes, is made up of a number of specific characters, each of which depends upon a certain chemical particle or aggregation of molecules, which perpetuates itself and multiplies by self-division. So long as the descendant chemical particles remain like the parental ones, so long the species persists. These particles may, however, suddenly change through some cause, not precisely known, but probably environmental; and with a change in one of these particles goes a change in the adult specific quality that it controls, and also of the "correlated" qualities. The consequence is that a form with many new qualities suddenly arises, and this form we may call a new species. De Vries has studied (*Die Mutationstheorie*, 1901) variable species in the field —e.g., the evening primrose—and finds that new forms, clearly marked off from the original, typical ones, are constantly arising. They are, from the beginning, distinct and fully formed species. There are, however, other theories to account for that "distinctness" or isolation which is not infrequently found. One is that species originated in isolated situations.

A group of land animals, getting by accident upon an island and varying normally, will in time come to be quite dissimilar from the forms on the mainland, because, being isolated, any peculiarities that may crop out among them will not be swamped by intercrossing with the main mass of the species. Thus, we find in the Galapagos Islands that each island has a peculiar species of lizard of a particular genus, and only one species occurs on each island. The same is true of certain sparrows on these islands. Even on islands nearer the mainland, like Nantucket or Fire Island, on the south side of Long Island, there are peculiar forms—incipient species. It is the isolation which has permitted them to arise; even a less degree of isolation may permit a difference to grow up. Thus, Darwin tells this story: "The two flocks of Leicester sheep kept by Mr. Buckley and Mr. Burgess have been purely bred from the original stock of Mr. Bakewell for upward of 50 years. There is not a suspicion existing in the mind of any one at all acquainted with the subject that the owner of either of them has deviated in any one instance from the pure blood of Mr. Bakewell's flock; and yet the difference between the sheep possessed by these two gentlemen is so great that they have the appearance of being quite different varieties." Darwin's explanation of the lack of intergrades between many species differs from the foregoing, and depends on the assumption that, of the descendants of any species, those that are most unlike are most apt to survive; so that where the number of forms (varieties or subspecies) is very great, the intermediate ones (the intergrades) are pushed to the wall and are extinguished. In Darwin's words: "As in each fully stocked country natural selection necessarily acts by the selected form having some advantage in the struggle for life over other forms, there will be a constant tendency in the improved descendants of any one species to supplant and exterminate, in each stage of descent, their predecessors and their original progenitor. For it should be remembered that the competition will generally be most severe between those forms which are most nearly related to each other in habits, constitution, and structure. Hence all the intermediate forms between the earlier and later states—that is, between the less and more improved states of the same species—as well as the original parent species itself, will generally tend to become extinct. So it probably will be with many whole collateral lines of descent, which will be conquered by later and improved lines." This striking passage of Darwin deserves an experimental or statistical test. Until that is had, it can only stand as an excellent illustration of Darwin's logical treatment of special difficulties in his theory.

Another important attribute of a species is that its members are frequently sterile, with even closely related species. It would, however, be a mistake to assume that, on the one hand, all species, or even the hybrid offspring of crossed species, are always sterile. It is likewise an error to suppose that, on the other hand, sterility is confined to crosses between species. Breeders of animals are accustomed to find a considerable percentage of sterility between members of the same species; and when the members are close blood relations, the percentage becomes very high. Nevertheless, the sterility of hybrids (crosses between species) is so common that Cuvier gave it as the sure criterion of species. For further facts and explanations of this question, see HYBRIDITY.

Finally, species are adapted to the conditions in which they live. By many this characteristic is considered a fundamental one; so that, when we have explained how their adaptations arise, we have explained how the species arose. It may be worth while, here, to state that there is a lack of unanimity in respect to the adaptive nature of all specific characters. Those who assert such adaptation insist that it cannot be denied that any given apparently useless organ may not be useful, or may not have been useful in some period of the animal's life, or that of its ancestors. See EVOLUTION; NATURAL SELECTION; and similar titles, and the books mentioned thereunder.

Subspecies (or *variety*), in natural history, is the designation of a group subordinate to

species, distinguished from a race or breed chiefly by the circumstance that the latter two are artificial. Subspecies are regarded as the first step in the formation of species. They are not to be confused with variations, since, like species, they are groups of similar individuals. The question of when to call two differing lots of animals species and when subspecies is not capable of satisfactory solution, except by erecting an artificial and arbitrary bar separating them. In the absence of any such arbitrary rule, we find some naturalists "splitting" one species into many by elevating the subspecies to specific rank; while another naturalist will "lump" several species, reducing them to the rank of subspecies of one species. Many authors would consider subspecies to be founded on differences due to environment—differences that will disappear with changing environment. Those who are radical in recognizing by name minute and transitory differences of this kind confess that they cannot recognize with certainty their own subspecies, unless they know the habitat of the specimen. Other authors regard the difference between subspecies and species to be solely one of degree of divergence in characters. As subspecies became recognized, the custom was formed of adding a subspecific name to the specific name, as has already been explained.

Genus.—A category having a rank between species and family, and consisting of a group of species deemed to be more closely related to each other than to anything else. There is absolutely no criterion by which we can distinguish between a genus and a species, on the one hand, and a family on the other; but it is often a fact that, when a collection of related species is arranged in an orderly fashion, more or less sharp breaks occur, which enable naturalists to draw lines. Consequently, the boundaries of genera are being constantly widened or restricted; and generic names change and disappear as a result of fusion of genera or of splitting up of a genus. Since the genus is that under which species are usually indexed, this instability of generic names is highly regrettable. What is needed is a recognition of the subjectiveness of generic names and of the prime necessity of the stability of nomenclature; no changes in generic names should be made without the best of reasons. The name of the genus (always written with a capital initial) is combined with that of the species. The name of the cat genus, for example, is *Felis;* and *Felis leo, Felis tigris, Felis catus* are the names of the lion, tiger, and wildcat species. These cats are more alike to one another than any one of them is to the dogs. The latter belong to the genus *Canis.* The size of a genus varies with the number of species it contains; some genera containing a hundred species or more, while others contain only one. Darwin believed that the species of a large genus are more variable than those of a small one. In any case, the species within a genus are not regarded as having diverged very widely from their common stock, and the criteria for generic distinctions are largely superficial characteristics.

Family.—A group of genera having a certain resemblance to one another, which indicates common descent, or "family connection." Features of structure more or less external, and belonging to parts, as limbs, wings, teeth, horns, etc., characteristic of methods of life, are of the kind of characters used in judging of family limits. Thus, the prime family distinction of the cats (Felidæ) is the arrangement for retracting the claws, which sharply defines them as a group from the dogs, on the one hand, and the civets on the other; but the cheeta is able to retract its claws only partly, and this fact, in connection with other distinctive features, causes the animal to be placed in a genus separate from *Felis.*

Order.—Several related families may fall together, by the possession in common of characters denied to others, into a larger category known as an order. A familiar example is the order Carnivora, embracing the families of cats, dogs, civets, weasels, bears, etc., because all these exhibit an organization developed along lines of differentiation from other mammals, tending to fit them to prey upon other animals and digest a flesh diet. The various lines and degrees of specialization are recognized by subordinate groupings in families and genera.

Class.—Groups of orders are found to agree in certain very general and fundamental characteristics of organization, such as having six legs or eight legs; the production, by the skin, of hair, feathers, or scales; the integument being leathery or calcareous—and so on; and such groups form the next larger category, called a class. Even here, however, there is large room for difference of opinion as to limits; and, in some classes, an intermediate category called subclass seems necessary, as in the case of the prime division of the class Mammalia into monodelphic and didelphic, or of the class Cephalopoda into dibranchiate and tetrabranchiate. The same difficulty has led to naming groups of intermediate rank elsewhere—such as superfamilies, subfamilies, subgenera, etc.

Phylum.—Classes combine into several grand divisions of the animal kingdom, called subkingdoms, or phyla, by having in common a single or a few characteristics so broad and ancestral that they are spoken of as "plan of structure." Thus, all the mammals, birds, reptiles, amphibians, and fishes, together with several lowly representatives, such as the ascidians, are united by a single characteristic of structure possessed by no other animals—the presence of a backbone, or its essential equivalent, the notochord. This character is so wide-reaching and fundamental that it springs from the very root of the phylogenetic tree, and is of prime importance. By similar broad and fundamental "plans of structure" are the other phyla of the 12 now recognized by most zoölogists characterized. Their origin is lost to view in the mists of primeval time, but even here two divisions may be recognized—the Protozoa and the Metazoa—the former embracing the single phylum Protozoa, or one-celled animals; the latter, all the rest which agree in consisting of many cells, having a two-layered embryonic development.

Historical Sketch of Classification. The Greeks had considerable knowledge concerning animals, which Aristotle recorded, added to, and arranged, for the first time of which we have any knowledge, in an orderly fashion. Aristotle had some conception of genera and species. It is true that his *γένος* (*genos*) was a rather elastic term, since it was applied both to small and large groups of animals. Aristotle also conceived a difference between vertebrates and invertebrates, although he made the distinction by means of an erroneous definition. The following are the eight groups of animals as defined by Aristotle:

Animals with Blood—Vertebrates:

1. Viviparous animals (four-footed), and in a special *γένος* (*genos*) of this the whale was placed. 2. Birds. 3. Oviparous, four-footed animals. 4. Fishes.

Animals without (red) Blood—Invertebrates:

5. Soft animals (*μαλάκια, malakia*, i.e., Cephalopoda). 6. Animals with soft shells (*μαλακόστρακα, malakostraka*, i.e., Crustacea). 7. Insects. 8. Shelled animals (sea urchins, snails, mussels).

The elder Pliny added little to our knowledge of animals. He was simply a compiler, who copied freely from Aristotle, whom he sometimes misunderstood, and he admitted much of the error and superstition of his time to rank with fact. It was not until the seventeenth century that any very great addition to our knowledge of the structure, development, and relations of animals was made.

Linnæus to Cuvier.—Ray wrote a *Synopsis of Mammalia and Reptilia* (London, 1693), which was used by the master systematizer, Linnæus (1707–78), in his *Systema Naturæ*, as the foundation upon which he built that part of his classification that had to do with vertebrates. Linnæus did not add much to our knowledge as an investigator; but he sifted and sorted, rejected and retained, from the accumulations of his predecessors, and out of this more or less chaotic mass he erected his orderly system—the first great classification of animals. His *Systema Naturæ* went through 13 editions, 12 of which were published during his lifetime, and 5 of these were revisions by his own hand. The arrangement by Linnæus was into "classes," as follows: 1. Mammalia. 2. Aves. 3. Amphibia (including reptiles). 4. Pisces. 5. Insects (including insects proper, myriapods, arachnids, and crustaceans). 6. Vermes (radiates, mollusks, worms, cirripeds, and a fish, myxine).

This classification was based mainly on external appearance and some internal anatomy; and, though imperfect and incomplete, it gave a great impulse to the study of zoölogy and to more orderly arrangements of animals. based on anatomical characters. It was Linnæus who introduced binary nomenclature, since he first gave every animal a generic and a specific name of Latin origin.

The next great systematist was Cuvier (1769–1832). "Cuvier did not," says Claus, "as most zoötomists have done, look upon anatomical discoveries and facts as in themselves the aim of his researches; but he contemplated them from a comparative point of view, which led him to the establishment of general principles." Moreover, Cuvier appreciated fully the idea of "correlation." "The organism," he declared, "consists of a single and complete whole, in which single parts cannot be changed without causing changes in all the other parts." Cuvier became convinced, from a study of the nervous system and the arrangement of the systems of organs, that the animal kingdom is divided into four great branches (*Tableau élémentaire de l'histoire naturelle des animaux*, Paris, 1798) as follows:

Branch 1. *Animalia Vertebrata.* Classes: 1. Mammalia. 2. Aves. 3. Reptilia. 4. Pisces.

Branch 2. *Animalia Mollusca.* Classes: 1. Cephalopoda (not subdivided). 2. Pteropoda (not subdivided). 3. Gastropoda. (Orders: Pulmonata, Nudibranchia, Inferobranchia, Tectibranchia, Heteropoda, Pectinibranchia, Tubulibranchia, Scutibranchia, Cyclobranchia.) 4. Acephala. (Orders: Testacea, Tunicata.) 5. Brachiopoda (no subdivisions). 6. Cirrhopoda.

Branch 3. *Animalia Articulata.* Classes: 1. Annelides. (Orders: Tubicolæ, Dorsibranchiæ, Abranchiæ.) 2. Crustacea. (Section 1: Malacostraca. Orders: Decapoda, Stomatopoda, Amphipoda, Læmodipoda, Isopoda. Section 2: Entomostraca. Orders: Brachiopoda, Pœciloppoda, Trilobitæ.) 3. Arachnides. (Orders: Pulmonariæ, Trachearіæ.) 4. Insects. (Orders: Myriapoda, Thysanura, Parasita, Suctoria, Coleoptera, Orthoptera, Hemiptera, Neuroptera, Hymenoptera, Rhipiptera, Diptera.)

Branch 4. *Animalia Radiata.* Classes: 1. Echinoderms. (Orders: Pedicellata, Apoda.) 2. Intestinal Worms. (Orders: Nematoidea, Parenchymatosa.) 3. Acalephæ. (Orders: Simplices, Hydrostaticæ.) 4. Polypi (Anthozoa, Hydroida, Bryozoa, Corallinæ, Spongiæ). (Orders: Carnosi, Gelatinosi, Polypiarii.) 5. Infusoria. (Orders: Rotifera, Homogenea.)

Lamarck to Leuckart.—Probably to Lamarck, more than to any other systematist, we are indebted for the term "Invertebrata" and to the arrangement of groups in an ascending series. In his *Histoire naturelle des animaux sans vertèbres* (Paris, 1801), he classifies the invertebrates as follows (accepting the vertebrates as arranged by Cuvier):

I. *Apathetic Animals.* Do not feel; no brain, no senses; rarely articulated.

Class 1. Infusoria. Orders: Nuda, Appendiculata.

Class 2. Polypi. Orders: Ciliata (Rotifera), Denudati (hydroids), Vaginati (Anthozoa and Bryozoa), and Natantes (crinoids and some halcyonoids).

Class 3. Radiaria. Orders: Mollia (Acalephæ), echinoderms (including Holothuriæ and Actiniæ).

Class 4. Tunicata. Orders: Botryllaria (compound ascidians), Ascidia (simple ascidians).

Class 5. Vermes. Orders: Molles and Rigiduli (intestinal worms and gordius), Hispiduli (Nais), Epizoariæ (epizoa and lernæans).

II. *Sensitive Animals.*

Class 6. Insects (hexapods). Orders: Aptera, Diptera, Hemiptera, Lepidoptera, Hymenoptera, Neuroptera, Orthoptera, Coleoptera.

Class 7. Arachnids. Orders: Antennatotracheales (Thysanura and Myriapoda), Exantennatotracheales and Exantennatobrancheales (Arachnida proper).

Class 8. Crustacea. Orders: Heterobranchia (Branchiopoda, Isopoda, Amphipoda, Stomapoda) and Homobranchia (Decapoda).

Class 9. Annelids. Orders: Apoda, Antennata, Sedentaria.

Class 10. Cirripeds. Orders: Sessilia and Pedunculata.

Class 11. Conchifera. Orders: Dimyaria, Monomyaria.

Class 12. Mollusks. Orders: Pteropoda, Gastropoda, Trachelipoda, Cephalopoda, Heteropoda.

Siebold and Stannius (1845) also divided the animal kingdom into vertebrates and invertebrates; and among the invertebrates the Protozoa were recognized as a separate type, and Vermes came to have very much the significance that it has in our modern classifications.

The classification of Leuckart is interesting, because it comes near to our present conceptions of the relationship of animals, and because of the fact that its author was a great teacher of zoölogy; and, hence, his classification has had

great influence in education. Leuckart, *Die Morphologie und die Verwandtschaftsverhaltnisse der wirbellosen Thiere* (Brunswick, 1848), divides animals above Protozoa (to which he paid no attention) into six "types," as follows:

Type I. *Cœlenterata.*

Class 1. Polypi. (Orders: Anthozoa and Cylicozoa.)

Class 2. Acalephæ. (Orders: Discophoræ and Ctenophoræ.)

Type II. *Echinodermata.*

Class 3. Pelmatozoa. (Orders: Cystidea and Crinoidea.)

Class 4. Actinozoa. (Orders: Echinida and Asterida.)

Class 5. Scytodermata. (Orders: Holothuriæ and Sipunculida.)

Type III. *Vermes.*

Class 6. Anenterati. (Orders: Cestodes and Acanthocephali.)

Class 7. Apodes. (Orders: Nemertini, Turbellarii, Trematodes, and Hirudinei.)

Class 8. Ciliati. (Orders: Bryozoa and Rotiferi.)

Class 9. Annelides. (Orders: Nematodes, Lumbricini, and Branchiati.)

Type IV. *Arthropoda.*

Class 10. Crustacea. (Orders: Entomostraca and Malacostraca.)

Class 11. Insecta. (Orders: Myriapoda, Arachnida, and Hexapoda.)

Type V. *Mollusca.*

Class 12. Tunicata. (Orders: Ascidiæ and Salpæ.)

Class 13. Acephala. (Orders: Lamellibranchiata and Brachiopoda.)

Class 14. Gastropoda. (Orders: Heterobranchiata, Dermatobranchia, Heteropoda, Ctenobranchia, Pulmonata, and Cyclobranchia.)

Class 15. Cephalopoda.

Type VI. *Vertebrata* (according to Cuvier).

Oken, Von Baer, and Agassiz.—The foregoing and certain other classifications had been developed in England, France, and Germany, under the guidance of anatomy; but, in many of them, the idea of the complexity of structure of animals seemed to outweigh the idea of unity of structure. During the early part of the nineteenth century another school developed in Germany, under the leadership of Schelling—the School of Natural Philosophy—which has extended its influence to all the physical sciences. Of its doctrines such men as Geoffroy Saint Hilaire in France, and Goethe and Oken in Germany, became expounders, and taught that unity prevailed everywhere; hence, the animal kingdom was composed of an unbroken series of animals. The most important system of classification evolved by this school is that of Oken. Corresponding with the invertebrates is Oken's intestinal body, or touch animals, as he called them (*Lehrbuch der Naturphilosophie,* Jena, 1810).

Grade 1. Intestinal Animals.

Cycle I. *Digestive Animals* (Radiata).
Class 1. Infusoria (Stomach Animals).
Class 2. Polypi (Intestine Animals).
Class 3. Acalephæ (Lacteal Animals).
Cycle II. *Circulative Animals* (Mollusks).
Class 4. Acephala (Biauriculate Animals).
Class 5. Gastropoda (Uniauriculate Animals).
Class 6. Cephalopoda (Bicardial Animals).
Cycle III. *Respirative Animals* (Articulata).
Class 7. Worms (Skin Animals).
Class 8. Crustacea (Branchial Animals).
Class 9. Insects (Tracheal Animals).

At the time that the School of Natural Philosophy was thriving, another school had arisen in Germany, which was rapidly accumulating a new set of facts. This was the School of Embryologists, which seems to have arisen under the influence of Döllinger and such men as Rathke, Van Beneden, Von Baer, Kölliker, and Vogt as disciples. Von Baer early got the idea that the ontogenetic development of animals is a recapitulation of their phylogenetic history; and, in conformity with his embryological investigations, he proposed the following classification of animals:

I. Peripheral Type (Radiata).
II. Massive Type (Mollusca).
III. Longitudinal Type (Articulata).
IV. Doubly Symmetrical Type (Vertebrata).

Thus, Von Baer, with his classification based on embryological principles, and Cuvier, with his founded on comparative anatomy, arrived at very similar general conclusions; viz., that animals are built on four general plans, fall into four general types. In the end the system of Cuvier triumphed over that of the Natural Philosophers. The later advances in the classification of animals have been mainly made in filling gaps and correcting errors. The number of types has been increased. The Protozoa have become a distinct type, Cœlenterata and Echinodermata have been separated; likewise Arthropoda and Annelida, and the old group Mollusca has been broken up. The earlier classifications, founded mainly on external resemblances and grosser anatomical likenesses, were then greatly improved by the refinement of anatomical technique —by the use of the microscope, by the study of embryology, by the distinction between analogy and homology, by a knowledge of the fertility of animals in cross breeding, and by the study of fossil forms. With the discovery of so many intermediate forms we are coming back towards the views of the Natural Philosophers, who maintained that unity rules throughout the animal kingdom, as well as in all others; that intermediate forms connect the various types, and that there is no sharp line of demarcation to be drawn between the various groups of animals.

Two systems which have had great influence, especially in directing the study of the different invertebrates, were those of Louis Agassiz and Huxley. Agassiz retained the four types of Cuvier. Most of the Protozoa he considered to be algæ, and such forms as the Vorticella he thought would be found to be closely related to the Bryozoa. Following is an outline of Agassiz's arrangement, from his *Essay on Classification* (Boston, 1859):

I. *Radiata.*
1. Polypi: Actinoids and Halcyonoids.
2. Acalephæ: Hydroids, Discophoræ, and Ctenophoræ.
3. Echinoderms: Crinoids, Asteroids, Echinoids, Holothurioids.

II. *Mollusca.*
1. Acephala: Bryozoa, Brachiopods, Tunicata, Lamellibranchiata.
2. Gastropoda: Pteropoda, Heteropoda, and Gastropoda.
3. Cephalopoda: Tetrabranchiata and Dibranchiata.

III. *Articulata.*
1. Worms: Trematodes, Nematodes, Annelids.

2. Crustacea: Rotifera, Entomostraca, Tetradecapods, and Decapods.

3. Insecta: Myriapods, Arachnids, and Insects proper.

Huxley arranges the invertebrates in nine sections, as follows:

Section 1. Monera (Foraminifera; Heliozoa); Radiolaria, Protoplasta, Gregarinidæ, Catallacta, Infusoria (Opalinina, Ciliata, Flagellata, Tentaculifera).

Section II. Porifera, Hydrozoa, Coralligena (Ctenophora).

Section III. Turbellaria, Rotifera (Nematorhyncha), Trematoda, Cestoidea.

Section IV. Hirudinea, Oligochæta, Polychæta, Gephyrea.

Section V. Crustacea, Arachnida (Pycnogonida, Tardigrada, Pentastomida), Myriapoda, Insecta.

Section VI. Polyzoa, Brachiopoda, Lamellibranchiata, Odontophora.

Section VII. Echinodermata.

Section VIII. Tunicata.

Section IX. Groups of uncertain place: Peripatidea, Myzostomata, Enteropneusta, Chætognatha, Nematoidea, Physemaria, Acanthocephala, Dicyemida.

"Our knowledge," says Huxley, "of the anatomy, and especially of the development of the Invertebrata, is increasing with such prodigious rapidity, that the views of taxonomists in regard to the proper manner of expressing that knowledge by classification are undergoing, and, for some time to come, are likely to undergo, incessant modification. To the beginner, who is apt to make the mistake of looking upon classification as the foundation and essence of morphology, instead of what it really is, the superstructure and outcome thereof, this state of things is distressing. Every handbook presents him with a different system of classification; and he may, not unnaturally, despair of finding any stability in science, the most general results of which are capable of being stated in such different ways. If, however, the student will attend to the facts which constitute the subject matter of classification, rather than to the modes of generalizing them which are expressed in taxonomic systems, he will find that, however apparently divergent these systems may be, they have a great deal in common."

It has seemed desirable to dwell somewhat on the history of the classification of the Invertebrata, because invertebrates have been the battling ground, the bone of contention, with systematists since the time of Linnæus. The classification of vertebrates was early agreed upon; indeed, four of the six classes now accepted have come down to us from Aristotle's time.

Classification of Vertebrates. *Fishes.*—Ichthyology began as a science with Artedi, who made a division into five classes, in a useful but very artificial manner. This continued substantially unchanged until the gigantic labors of Cuvier resulted in a revised classification, much nearer nature, recognizing clearly the distinction between the fishes with bony skeletons and those with cartilaginous skeletons. Agassiz followed with a classification based upon the forms of the scales, the most important feature of which was the recognition of the group Ganoidei. The next great generalization in this direction of systematic arrangement was that of J. Müller, who developed the distinctness of Amphioxus and the lampreys from other cartilaginous fishes, and so established the new groups Cyclostomi and Leptocardii; he also proposed the group Dipnoi for Lepidosiren. Huxley's studies and new material threw new light upon the subject, and aided Gunther to form a classification of fishes which, with one important exception, is still held by ichthyologists. For details, see FISH.

Amphibia.—The Amphibia were for a long time confused with the Reptilia. Thus Linnæus, 1767, who first used the term Amphibia as a group name, included under it: 1. *Reptiles pedati*, including turtles (Testudo); Draco Lacerta (including crocodiles, lizards, and newts); and Rana. 2. *Serpentes apodi.* 3. *Nantes pinnati*, including certain fishes. Brongniart, 1800, classifies reptiles as: Chelonia, Saurii, Ophidii, and Batrachii (the last including frogs, toads, and newts). Latreille, 1804; Duméril, 1806; and Oppel, 1811, while more sharply discerning the true subdivisions of amphibians, still retain them under the head of reptiles. First, De Blainville, writing in 1816, makes Reptilia and Amphibia coördinate, but subdivisions of the "Amphibiens"; so likewise Stannius, as late as 1856. Latreille, 1821, however, proposes a classification which is essentially the same as that we now accept.

Reptiles.—Reptiles were put by Linnæus under the class Amphibia, and it was not until Brongniart separated them that herpetology began upon a philosophic basis. It was further advanced by Duméril (1807) and Oppel (1811), who placed Cæcilia with the amphibians. Cuvier and other writers did little to establish a rational system within this group; and even Duméril and Bibron, in their great *Erpétologie générale* (1834–54), cling to the idea that the batrachians are only separable as an order from reptiles. Although De Blainville, Leuckart, and others had advocated a much deeper separation, it was not until Huxley's investigations demonstrated the necessity of regarding the Amphibia and Reptilia as distinct classes that they were so set apart. See REPTILE.

Huxley, in his *Anatomy of Vertebrated Animals* (1871), divided the Vertebrata into Ichthyopsida (fishes, leptocardians, marsipobranchs, and Amphibia), Sauropsida (birds and reptiles), and Mammalia.

Mammals and Birds.—Birds were too easily distinguished and too compact a class to have been much confounded with anything else, though mediæval writers often put bats, bees, etc., under the name. The history of their classification, therefore, falls within lines agreed upon from the first, and belongs to the article BIRD. The same may be said of the class Mammalia, where the only confusion arose from the foolishness of a few mediæval authors, who classed bats among birds, and whales with fishes; the history of its classification will be found under MAMMALIA.

Outline of Modern Classification. The earlier writers always classified the animal kingdom in a linear series; usually beginning with mankind, and "descending" to the creatures deemed most inferior. This was not with them, as it is with us, a mere matter of convenience in making a list of the groups, but expressed their belief in the doctrine, unchallenged from antiquity to the time of Lamarck and Cuvier, that there existed what they called a *scala naturæ*. They meant by that their belief that all animals could be arranged in an ascending

scale of organization—the infusorians being succeeded by polyps, these by radiated forms, these by worms, and so on to fishes, reptiles, birds, and mammals. The orders within each class, the genera within each family, conformed to the same scale of increasing complexity; so that a linear classification, from the lower invertebrates to the highest vertebrates, was the expression of their belief in an even progress of structure. Cuvier broke into this by his arrangement of the animal kingdom, into four groups, unrelated to each other—Radiata, Articulata, Mollusca, and Vertebrata—to be classified in parallel columns, if at all; and this, again, has been superseded by the conception of a form of classification which simulates a branching tree, and tries to express a true genetic arrangement (see PHYLOGENY), the first attempt at which was made by Lamarck. It is, however, impracticable in the present work to attempt such an expression of the classification of animals, except for restricted groups; and, in general, the linear arrangement must be used, bearing in mind that it is a convenient, not a scientific, expression.

The classification outlined below, and followed throughout this ENCYCLOPÆDIA, is that made by Profs. T. Jeffrey Parker and William A. Haswell (*Text-Book of Zoölogy*, London and New York, 1910). It is one of the most satisfactory formulations of scientific conclusions, has a wide acceptance, and is generally accessible to students and readers. These considerations outweigh, for the purposes of a popular encyclopædia, any objections likely to be urged against these authorities by specialists. The advantage of taking and keeping a uniform standard of classification and nomenclature throughout a work of this kind is too evident to require argument; and should there be good reason to differ from it, here and there, these exceptions and divergences may easily be treated as they arise. It is a fact that in many ways any scientific work such as the one mentioned is out of date as soon as published, so rapid is the advance of knowledge and discovery in the scientific field, but some general standard is necessary. In paleontology this scheme is supplemented by the substantially identical classification of Zittel-Eastman (Karl A. Von Zittel, *Grundzüge der Paläontologie*, Munich, 1895; translated and modified by C. R. Eastman, as *Text-Book of Paleontology*, New York and London, 1900).

It is needful here only to sketch the arrangement of the larger groups, leaving the treatment of orders, families, and lesser divisions to be given in the descriptive articles under the titles of groups, as BIRD, FISH, PROTOZOA, ETC.

CLASSIFICATION OF ANIMALS

LIST OF PHYLA, CLASSES, AND SUBCLASSES

SUBDIVISION PROTOZOA

(*Unicellular Animals*).

Phylum I. PROTOZOA (Protozoans). Animals composed of a single cell; or, if of several cells, these are of one kind.

- Class 1. RHIZOPODA. Protozoa with retractile pseudopodia (Amœba, etc.).
- Class 2. MYCETOZOA. Terrestrial protozoa, plasmodial, and forming large and complex cysts (Slimes).
- Class 3. MASTIGOPHORA. Protozoa without cilia, but with one or more flagella.
- Class 4. SPOROZOA. Protozoa, without appendages; internal parasites.
- Class 5. INFUSORIA. Protozoa with cilia, or sucking tentacles.

SUBDIVISION METAZOA

(*Multicellular Animals*).

Phylum II. PORIFERA (Sponges). Fixed aquatic Metazoa, whose body wall is perforated by incurrent pores.

- Class PORIFERA. Equivalent to the Phylum.
  - Subclass 1. *Calcarea*. Sponges with skeleton of calcareous spicules.
  - Subclass 2. *Non-Calcarea*. Skeleton, when present, composed of siliceous spicules or of spongin fibres.

Phylum III. CŒLENTERATA (Polyps, etc.). Animals of radial structure, whose digestive cavity is lined by the body wall, and which have nettling organs.

- Class 1. HYDROZOA. Cœlenterates, whose body is composed of more than two rays, and contains a single cavity (Hydroids, Siphonophores, etc.).
- Class 2. SCYPHOZOA. Cœlenterates with many radii, and with radial partitions in the cavity of the body (Jellyfishes).
- Class 3. ACTINOZOA. Attached individuals or colonies.
  - Subclass 1. *Zoantharia*. Tentacles numerous, and usually in multiples of five (Sea Anemones, Madrepores, and Corals).
  - Subclass 2. *Alcyonaria*. Tentacles, eight only (Red Corals, Sea Fans, etc.).
- Class 4. CTENOPHORA. Cœlenterates with only two radii, and rows of cilia plates.

Phylum IV. PLATYHELMINTHES (Flatworms). Bilaterally symmetrical, soft-bodied animals, without true segmentation of the body; flattened in a dorso ventral direction, and having the body cavity filled with a loose meshwork of cells.

- Class 1. TURBELLARIA. Free-living flatworms, whose body is covered by cilia; alimentary tract with only one opening to the exterior (Planarians).
- Class 2. TREMATODA. Parasitic, unsegmented, without cilia in the adult, and with a well-developed digestive apparatus (Flukes).
- Class 3. CESTODA. Elongated, usually unsegmented hermaphrodite endoparasites, without mouth or alimentary canal (Tapeworms, etc.).
- Class 4. NEMERTINEA. Body more or less flattened; food canal with mouth and arms; aquatic, carnivorous.
  - Subclass 1. *Palæonemertinea*.
  - Subclass 2. *Schizonemertea*.
  - Subclass 3. *Hoplonemertea*.

Phylum V. NEMATHELMINTHES (Roundworms). Bilateral, unsegmented, round-bodied; usually with alimentary tract, mouth, and arms.

- Class 1. NEMATODA. With intestinal canal; without proboscis; free-living in fresh or salt water, or parasitic (Threadworms).
- Class 2. ACANTHOCEPHALA. Mouth and intestines wanting; parasitic.
- Class 3. CHÆTOGNATHA. Pelagic "arrow worms"; spiny, and with a well-developed nervous system.

Phylum VI. TROCHELMINTHES (Wheel Animalcules). Characterized by having the larva in the form of a trochosphere.

Class 1. ROTIFERA. Microscopic wheel animalcules, with a ciliated band around the mouth, and a special organ for attachment.

Class 2. DINOPHILEA. Minute, wormlike, having five to eight segments, usually ciliated; and nephridia in pairs; marine.

Class 3. GASTROTRICHA. Minute, spindle-shaped, flattened and ciliated on the ventral surface; fresh waters.

Phylum VII. MOLLUSCOIDA (Sea Mats and Brachiopods). Small aquatic animals, having a true body cavity (except in Endoprocta) and suspended alimentary canal; dorsal region abbreviated and surmounted by lophophore.

Class 1. POLYZOA. Molluscoida that form colonies connected by one organic substance; the ciliated band of the lophophore is drawn out into tentacles (Bryozoans).

Subclass 1. *Ectoprocta.* Anus outside tentacular corona.

Subclass 2. *Endoprocta.* Anus internal; form colonies by budding.

Class 2. PHORONIDA. Wormlike polyzoans, living in associations of individuals born from ova, not by buds.

Class 3. BRACHIOPODA. Polyzoa with the body inclosed in a shell of two valves; body usually attached by a stalk (Lamp Shells).

Phylum VIII. ECHINODERMATA (Echinoderms). Animals of prevailingly radical structure, with intestinal wall distinct from body wall, and with calcareous plates in the skin.

Class 1. ASTEROIDEA. Star-shaped echinoderms, with a furrow (ambulacrum) along the underside of the arms (Starfish).

Class 2. OPHIUROIDEA. Star-shaped echinoderms, with the arms sharply marked off from the body, and not grooved (Brittle Stars).

Class 3. ECHINOIDEA. Echinoderms with the body globular or disk-shaped, and armless (Sea Urchins).

Class 4. HOLOTHUROIDEA. Echinoderms elongated, wormlike, usually soft, and with tentacles about the mouth (Trepangs).

Class 5. CRINOIDEA. Sessile, and having a cup-shaped body (Crinoids).

Class 6. CYSTOIDEA. Globular, sessile, or stalked (Fossil).

Class 7. BLASTOIDEA. Ovate, stalked (Fossil).

Phylum IX. ANNULATA (Worms). Bilateral segmented worms without jointed legs.

Class 1. CHÆTOPODA. Worms made up of a series of metameres, each bearing parapodia and cirri (Annelids).

Subclass 1. *Polychæta.* Sexes distinct; ovaries and testes simple and metamerically repeated (Marine Annelids).

Subclass 2. *Oligochæta.* Sexes united; ovaries and testes few and compact (Terrestrial and fresh-water).

Class 2. MYZOSTOMIDA. Disk-shaped, unsegmented (Parasites of Crinoids).

Class 3. GEPHYREA. Sessile annelids, without external segmentation in the adult (Marine).

Class 4. ARCHI-ANNELIDA. Minute marine annelids, faintly segmented, often parasitic.

Class 5. HIRUDINEA. Annelids with short rings or none at all, and with ventral suckers (Leeches).

Phylum X. ARTHROPODA (Insects, Crustaceans, etc.). Symmetrical segmented animals, with jointed appendages.

Class 1. CRUSTACEA. Typically aquatic and gill-bearing; usually two pairs of antennæ (Crustaceans).

Subclass 1. *Entomostraca.* Usually small, and with a varied number of appendages (Water Fleas, etc.).

Subclass 2. *Malacostraca.* Crustacea with nineteen pairs of appendages (Crabs, Crayfish, etc.).

Class 2. TRILOBITA. Body depressed, oval, and divided into head, thorax, and abdomen (Extinct Trilobites).

Class 3. ONYCHOPHORA. Cylindrical, unsegmented, papillose, and with a series of short walking appendages (Peripatus).

Class 4. MYRIAPODA. Tracheate arthropods, consisting of several segments, each bearing one or two pairs of legs (Centipedes and Millipedes).

Class 5. INSECTA. Arthropods with the body in three divisions—head, thorax, and abdomen—with six thoracic legs, and usually with wings (Insects).

Class 6. ARACHNIDA. Air-breathing arthropods, without antennæ (Spiders, Scorpions, etc.).

Phylum XI. MOLLUSCA (Mollusks). Animals with unsegmented body, and without jointed appendages; usually with a shell, and with a muscular organ of locomotion (the foot).

Class 1. PELECYPODA. Mollusks with a nearly symmetrical body, leaf-like gills, and a two-valved shell (Bivalves).

Class 2. AMPHINEURA. Bilaterally symmetrical; anus at end of body (Chitons).

Class 3. GASTROPODA. Body unsymmetrical, with head, feelers, eyes, and unpaired foot; shell (when present) univalve (Gastropods).

Subclass 1. *Streptoneura.* Visceral commissures twisted into a figure-of-8; sexes distinct (Limpets, Whelks, etc.).

Subclass 2. *Euthyneura.* Visceral commissures not twisted into a figure-of-8; sexes united (Pulmonates, Nudibranchs, etc.).

Class 4. SCAPHOPODA. Head rudimentary; mouth lobes formed into a tube, inclosing the delicate shell (Marine).

NOTE. The *Pycnogonida, Linguatulida,* and *Tardigrada,* "though not in any way related to one another, and of doubtful relationships to the Arachnida, are, as a matter of convenience, mentioned together here."—*Parker and Haswell.*

Subclass 1. *Scaphopoda.* As above (Tusk Shells).

Subclass 2. *Rhodope.* Minute, ciliated; no shell.

Class 5. CEPHALOPODA. Head large; mouth surrounded by arms; foot funnel-shaped (Cuttlefish).

Subclass 1. *Dibranchiata.* Two symmetrical branchiæ; funnel tubular (Squids and Octopods).

Subclass 2. *Tetrabranchiata.* Four branchiæ; shell multilocular (Nautilus and Ammonites).

Phylum XII. CHORDATA (Chordates). Animals having a notochord, which may (Subphylum C) persist from birth, and become "in the adult replaced more or less completely by a segmented bony or cartilaginous axis—the spinal or vertebral column."

Subphylum and Class A. ADELOCHORDA. Marine wormlike animals, having a notochord as larvæ (Balanoglossus, etc.).

Subphylum and Class B. UROCHORDA. Animals, simple or compound, marine, inclosed in a coriaceous test, composed largely of cellulose, and having a notochord when larvæ (Ascidians).

Subphylum C. VERTEBRATA. Animals bilaterally symmetrical, and having a backbone (Vertebrates).

SEC. I. ACRANIA. *Without a head* (includes only the family Branchiostomidæ, Amphioxus, etc.).

SEC. II. CRANIATA. *With a head* (Fishes, Reptiles, Birds, Mammals).

Class 1. CYCLOSTOMATA. Eel-like vertebrates, without a lower jaw; mouth suctorial, and armed with horny teeth (Lampreys).

Class 2. PISCES. Aquatic vertebrates, with persistent gills and paired fins (Fishes).

Subclass 1. *Elasmobranchii.* Fishes with a cartilaginous skeleton, in which the cranium is never ossified, nor contains membrane bones; gill openings usually in five pairs (Sharks and Rays).

Subclass 2. *Holocephali.* Cartilaginous fishes with four pairs of gill slits, nearly concealed by a fold of skin (Chimæras).

Subclass 3. *Teleostomi.* Fishes with the skeleton complicated by membrane bones and ossifications, or completely bony (Sturgeons and ordinary Fish).

Subclass 4. *Dipnoi.* Fishlike animals, having an apparatus for breathing atmospheric air (Lungfishes).

Subclass 5. *Ostracodermi.* Paleozoic fishes, with an exoskeleton extraordinarily developed about the head, and apparently with no endoskeleton (Cephalaspis, etc.).

Class 3. AMPHIBIA. Amphibious vertebrates, breathing by gills in the larval condition, and (usually) by lungs when adult, and having legs and five-toed feet (Amphibians).

Class 4. REPTILIA. Elongated, air-breathing vertebrates, with a horny epidermal skeleton of scales and one occipital condyle (Reptiles).

Class 5. AVES. Vertebrates clothed with feathers (Birds).

Subclass 1. *Archæornithes.* Birds having a prolonged tail of many vertebræ (Archæopteryx).

Subclass 2. *Neornithes.* Birds having the tail vertebræ compacted into a pygostyle (Modern Birds).

Class 6. MAMMALIA. Vertebrates which suckle their young, and are more or less clothed with hair (Mammals).

Subclass 1. *Prototheria.* Mammals with oviducts separated (Didelphia).

Subclass 2. *Theria.* Mammals with oviducts united for a longer or shorter part of their length (Monodelphia).

A. *Metatheria.* Young born in rudimentary condition, and sheltered in a pouch (Marsupials).

B. *Eutheria.* Young born in a uterus; no pouch present (Higher Mammals).

Bibliography. In addition to works mentioned above, consult: Bronn (editor), *Klassen und Ordnungen des Thierreichs* (Leipzig and Heidelberg, 1859 et seq.); Haeckel, *Natürliche Schöpfungsgeschichte* (Jena, 1868); Lankester, *Notes on Embryology and Classification* (London, 1877); Leunis, *Synopsis der Thierkunde* (Hanover, 1883–86); Huxley, *Anatomy of Vertebrates* (New York, 1878), and *Anatomy of Invertebrated Animals* (New York, 1888); *Standard Natural History* (Boston, 1885); Lang, *Text-Book of Comparative Anatomy* (London, 1891–96); Newton, *Dictionary of Birds* (London and New York, 1893–96); Sharpe, *Hand-List of Birds* (London, 1899–1909); *A. O. U. Checklist of North American Birds* (New York, 1910); *Royal Natural History* (London, 1895); *Cambridge Natural History* (Cambridge, Eng., 1895–1909); Lankester's *Treatise on Zoölogy* (London, 1900–1909); Parker and Haswell, *Text-Book of Zoölogy* (London and New York, 1910); Davenport, *Introduction to Zoölogy* (New York, 1900); Volumes in the *American Nature Series* (New York); Gregory, *The Orders of Mammals* (New York, 1910). See also books mentioned under EVOLUTION; EMBRYOLOGY; and such titles as BIRD, FISH, INSECT, etc., and under biographies of the naturalists above mentioned.

CLASSIFICATION OF PLANTS. See TAXONOMY.

CLASSIFICATION OF SHIPS. See A1; and LLOYDS.

CLAS'SIS (Lat., assembly). In the Reformed church of Holland and America, the name of an ecclesiastical body, made up of ministers and elders representative of churches, corresponding to a presbytery. The classis hears appeals from the consistories, which are the official boards of local churches, and the synod hears appeals from the classis. The classis also confirms and dissolves pastoral connections, ordains and deposes ministers, and sends delegates to the local and general synods. See REFORMED CHURCH IN AMERICA, THE.

CLAS'TIC ROCKS (Fr. *clastique*, from Gk. κλαστός, *klastos*, broken, from κλᾶν, *klan*, to break), or FRAGMENTAL ROCKS. A petrographic division which includes all rocks composed of

fragmental materials. See ÆOLIAN ACCUMULATIONS; AQUEOUS ROCKS; BRECCIA.

CLAT'SOP. An Indian tribe of the Chinookan stock. See CHINOOK.

CLAUDE, klôd, JEAN (1619–87). A French Protestant preacher and controversialist. He was born at La Sauvetat-du-Dropt, southwest France (ancient District of Agenais). He studied at Montauban, became pastor at Nîmes in 1654, and was also professor of theology in the Protestant college there, where in 1661 he was forbidden to preach, on account of his opposition to the proposed union with the Roman Catholics. In the next year he obtained a post at Montauban, but was removed from it also. He then went to Paris and was pastor at Charenton from 1666 until 1685. On the revocation of the Edict of Nantes (1685), he was ordered to leave France within 24 hours, and, being welcomed by William of Orange, preached at The Hague until his death, Jan. 13, 1687. He was the greatest leader of the French Reformed churches, their ablest disputant, their favorite preacher, and their truest representative. He is especially notable for the polemic he carried on against the school of Port Royal. His works include: *A Defense of the Reformation* (1671; Eng. trans., 1815), written in reply to an attack on the Calvinistic faith by Pierre Nicole, the celebrated Jansenist writer; *Complaints and Cruel Prosecutions of the Protestants* (1686; Eng. trans., 1707); and especially, as more familiar to English readers, *Essay on the Composition of a Sermon* (2 vols., 1778–79)—a much-used manual of homiletics, frequently reprinted from the edition of Charles Siméon. His son published *Œuvres posthumes de Jean Claude* (5 vols., Amsterdam, 1688). Consult *La Devèze* (Amsterdam, 1687).

CLAUDE LORRAIN, klôd lôr'răn'. See GELÉE, CLAUDE.

CLAU'DIA GENS (Lat., Claudian clan). A clan at Rome, of Sabine origin, the families of which were in part patrician, in part plebeian. The clan was established at Rome, about 504 B.C., by Appius Sabinus Regillensis, who came to Rome from Regillum, a town in the Sabine territory. He was consul in 495. His severity in enforcing the laws relating to debt was largely responsible for the secession of the plebs to the Sacred Mount. (See under ROME, *History of Rome during the Earliest or Regal Period.*) The names (see COGNOMEN) of the patrician families, distinguished for their arrogance and pride, are Cæcus, Caudex, Centho, Crassus, Pulcher, Regillensis, and Sabinus. The plebeian *cognomina* are Asellus, Canina, Centumalus, Cicero, Flamen, and Marcellus. Consult Mommsen, "Die patricischen Claudier," in *Romische Forschungen* (Berlin, 1865). See APPIUS CLAUDIUS CRASSUS; CLAUDIUS CÆCUS, APPIUS; MARCELLUS, MARCUS CLAUDIUS.

CLAU'DIAN AQUEDUCT. See AQUEDUCT; CLAUDIUS I.

CLAU'DIAN HARBOR. A harbor at the mouth of the Tiber, 2 miles west of Ostia, constructed in the face of great natural difficulties by the Emperor Claudius. Its area exceeded 6,000,000 square feet, with a depth of 15 to 18 feet; it was inclosed by two curving jetties, each 2400 feet long. An artificial island was constructed between the jetties by filling with concrete the great ship which had transported the Vatican obelisk from Egypt, sinking her, and from this foundation building above the level of the water. On the island rose a lighthouse 200 feet high, built in imitation of the Pharos of Alexandria. In time the Claudian harbor became inadequate to the needs of the city, and an inner harbor was constructed by Trajan, now 2 miles inland. The Claudian harbor, now inaccessible on account of marshes, is depicted on a bas-relief discovered in 1863. Consult Lanciani, *Ancient Rome in the Light of Recent Discoveries* (New York, 1889).

CLAU'DIA'NUS, CLAUDIUS. A Latin poet, born at Alexandria, who lived at the end of the fourth and the beginning of the fifth century. He came to Rome in 395 and there secured the patronage of Stilicho and, through him, of the Emperor Honorius. His love and admiration for Stilicho are voiced in a number of his minor poems. As Gibbon says, he "assumed in his mature age the familiar use and absolute command of the Latin language, soared above the heads of his feeble contemporaries, and placed himself, after an interval of 300 years, among the poets of ancient Rome." At the request of the Senate, the emperors Arcadius and Honorius erected a statue in his honor in the Forum of Trajan. The productions of Claudianus that have come down to us consist of three epic poems—*The Rape of Proserpine*, the incomplete *Battle of the Giants*, and a poem on the downfall of Rufinus, Minister of Arcadius at Constantinople, besides panegyrics on Honorius and Stilicho, idyls, epigrams, and occasional poems. Claudianus displays a brilliant fancy and rich coloring, with variety and distinctness in his pictures, especially in those pieces which deal with contemporary affairs. The best editions are by Birt (Berlin, 1892), in *Monumenta Germaniæ Historica*, x, and Koch (Leipzig, 1893). A poor English translation was executed by Hawkins (London, 1817). Consult: Hodgkin, *Claudian: The Last of the Roman Poets* (London, 1875); Crees, *Claudian as an Historian* (1908); C. H. Moore, "Rome's Past in the Poems of Claudian," in *The Classical Journal*, vol. vi, pp. 108–115 (1910).

CLAUDIANUS MAMER'TUS (c.425–c.474). A Christian poet and philosopher. A younger brother of St. Mamertus, Bishop of Vienna, he was consecrated by the latter to the priesthood and became his assistant. He systematized the liturgy and wrote the hymns known as the *Small Liturgies*, sometimes heard in Catholic churches during the services preceding Ascension Day. The hymns "Contra Poetas Varios" and "Pange lingua gloriosi lauream certaminis" have been ascribed to him. In his famous philosophical treatise, *De Statu Animæ* (published by Mosellanus, Basel, 1520, and, with notes, by C. Barth, Zwickau, 1655), he shows that "thought is inseparable from the essence of the soul, and that its spiritual activity is indestructible" (Neander, *History of Dogmas*), and urges the dualism of soul and body. He was highly praised by the poet Sidonius Apollinaris. His complete works were edited by Engelbrecht and published in *Corpus Scriptorum Ecclesiasticorum Latinorum*, vol. xi (Vienna, 1885). Consult Engelbrecht, *Untersuchungen über die Sprache des Claudianus Mamertus* (ib., 1885).

CLAU'DIA QUIN'TA. A Roman woman who strikingly disproved the charge of unchasteness brought against her. When the ship carrying the image of Cybele to Rome from Pessinus, in 204 B.C., grounded on a shoal at the mouth

of the Tiber, the soothsayers declared that it could be moved only by a pure woman; Claudia, seizing the rope, towed the ship to Rome.

CLAU'DIO. 1. In Shakespeare's *Much Ado About Nothing*, a young Florentine lord. 2. In Shakespeare's *Measure for Measure*, the lover of Juliet.

CLAU'DIUS. In Shakespeare's *Hamlet*, the King of Denmark, who poisons his brother, Hamlet's father, and marries the widow.

CLAUDIUS I (TIBERIUS CLAUDIUS NERO DRUSUS; officially TI. CLAUDIUS CÆSAR AUGUSTUS GERMANICUS) (10 B.C.–54 A.D.). Roman Emperor (41–54 A.D.). Youngest son of Nero Claudius Drusus, stepson of the Emperor Augustus, born at Lugdunum (Lyons). Since he was sickly and infirm, his education was neglected, or left to women and freedmen. His supposed imbecility saved him from the cruelty of Caligula; but Claudius in his privacy had made considerable progress in the study of history and wrote in Latin and Greek several extensive historical works now lost, on Rome, Carthage, and Etruria. After the assassination of Caligula the Pretorians, having found Claudius hiding in the palace, carried him forth, proclaimed him Emperor, and compelled his recognition by the Senate. By his payment of the troops, who had raised him to the throne, he inaugurated a baneful practice which, under the succeeding emperors, subjected Rome to a military despotism. The first acts of his reign gave promise of mild and just government; but in 42, when a conspiracy against his life was detected, his timidity led him to yield himself entirely to the guidance of his wife Messalina (q.v.), who, with the freedmen Pallas and Narcissus, practiced cruelties and extortions without restraint. Claudius lived in retirement, partly occupied in studies, and expended enormous sums in building, especially in the construction of the famous Claudian Aqueduct. This great work occupied 30,000 laborers during 11 years. He sought, too, to drain the Lacinus Fucinus. (See AVEZZANO. See also CLAUDIAN HARBOR.) He sought to introduce three new letters into the Latin alphabet. He showed himself also an able administrator, anxious for the good of his people. Abroad the armies of Claudius were victorious. Mauretania was made a Roman province, the conquest of Britain was commenced under the personal command of the Emperor, and some progress was made in Germany. After the execution of Messalina Claudius married his niece, Agrippina (q.v.), under whose influence he deprived his son Britannicus of the succession to the Imperial power and adopted Nero, son of Agrippina. When Claudius showed some inclination to deprive Nero of the succession, Agrippina caused him to be poisoned with a dish of mushrooms. After his death Claudius was deified, giving occasion to the bitter satire of Seneca, *Apocolocyntosis, Gourdification*, or *Pumpkinification*.

CLAUDIUS II (MARCUS AURELIUS CLAUDIUS, better known as CLAUDIUS GOTHICUS) (214–270), Roman Emperor (268–270). He had been Governor of Illyria and after the death of Gallienus, in 268, was proclaimed Emperor by the soldiers. In 268 he overthrew his rival, Aureolus, and conquered the Alemanni (q.v.); in 269 he defeated the Goths that menaced Mœsia, and 50,000 of them perished in battle. From this victory he gained the title *Gothicus*. Claudius died of the pest at Sirmium.

CLAUDIUS, ARCH OF. A triumphal arch at Rome, erected on the Via Lata in the Campus Martius, to commemorate the victories won by Claudius in Britain in 51–52 A.D. It was in ruins already in the eighth century.

CLAUDIUS, klou'dē-ŭs, MATTHIAS (1740–1815). A German poet and author, associated with the *Göttingen Hainbund*, and known as "Asmus," or "Der Wandsbecker Bote." He was born at Reinfeld, Holstein; studied from 1759 to 1763 at the University of Jena; from 1771 to 1775 was editor, under the name of "Asmus," of the newly established *Wandsbecker Bote* (whence his surnames), and in 1776 of the *Landzeitung*, at Darmstadt. In the following year he returned to Wandsbeck, where he henceforth lived. He was appointed in 1788 auditor of the provincial bank of Altona, by the Crown Prince Frederick of Denmark, who had also, in 1785, granted him a small annuity. His collected works, published in 1775–1812 (eight parts), with the quaint title *Asmus Omnia Sua Secum Portans*, were in great part taken from his contributions to the *Wandsbecker Bote*. His prose is shrewd, aphoristic, with a certain naïve humor; his verse, now buoyantly merry, now patriotic, now in the best sense religious, is always fresh, simple, and sincere. Many of his lyrics, such as "Der Mond ist aufgegangen" and the "Rheinweinlied" beginning "Bekränzt mit Laub," and "Das Kartoffellied" have continued to be popular favorites throughout Germany. He also translated into German Fénelon and other writers, French and English. The collected works have been excellently edited by Redlich (12th ed., Gotha, 1882). For his biography, consult Herbst (Gotha, 1878) and Gerok (Darmstadt, 1881).

CLAUDIUS CÆ'CUS, APPIUS. A Roman patrician of the fourth and third centuries B.C. When censor, in 312 B.C., he gained many adherents by invading the traditional rights of the patricians and admitting men of low birth to senatorial rank; but his nominations were quickly set aside. At the same time he constructed the great Appian Way from Rome to Capua, and also the first aqueduct (Aqua Appia) to bring a supply of water into the city. To complete these works, he arbitrarily continued his censorship for five years, though the legal period was 18 months. (See CENSOR.) He was consul in 307 and 296 B.C., and met with success in several campaigns against the Samnites and the Etruscans. When Pyrrhus of Epirus sent Cineas to Rome with terms of peace unfavorable to Rome, it was only the eloquence of the aged Claudius that prevented the Senate from accepting them. His speech on this occasion was extant in Cicero's time. By this speech, as well as by a collection of aphorisms, and a work *De Usurpationibus*, he laid the foundations of Latin prose. In his old age Claudius is said to have become blind, whence his cognomen "Cæcus."

CLAUDIUS CRAS'SUS, APPIUS. See APPIUS CLAUDIUS CRASSUS.

CLAUDIUS NERO. See NERO.

CLAUDIUS OF TU'RIN (Lat. *Claudius Turinensis*) (?–c.830). A Spanish-Italian bishop. At first a preacher at the court of Louis the Pious, he became Bishop of Turin in 820. He was one of the most radical iconoclasts of his time and protested against the use of images, the invocation of saints, and the veneration of relics. His attitude kept him in constant controversy with Pope Paschal I. Claudius wrote

an *Apologeticum*, directed against the Abbot Theodemir, of the convent of Psalmody, near Nîmes. The abbot's part was taken by Dungall, an Irish scholar and teacher. Jonas of Orléans, at the request of the Emperor, also wrote against Claudius, but both Louis and Claudius died before the publication of his work. Claudius opposed the growing power of the Bishop of Rome. Consult a dissertation by Rudelbach (Copenhagen, 1824).

CLAUDIUS PULCHER, APPIUS. A Roman author, orator, administrator, and brother-in-law of Lucullus, under whom he served in Asia against Tigranes and Mithridates, in 72–71 B.C. In 57 he was prætor, in 54 proprætor in Spain; in 54 he was consul. In 53, while he was governor of Cilicia, he corresponded with Cicero (consult Cicero's *Ad Familiares*, iii). After his return to Rome, he was impeached on charges of having exceeded his authority, as governor of Cilicia, but was acquitted. In 50, as censor, he won fame by the severity with which he expelled many from the Senate; he ejected, for instance, Sallust, on charges of immorality. He favored Pompey against Cæsar and went with Pompey to Greece; he died in Eubœa, about 48 B.C. The first book of his work on augury he dedicated to Cicero, who rated him highly as an orator and respected his knowledge of augury and Roman history (*Brutus*, 267).

CLAUDIUS PULCHER, PUBLIUS. Son of Appius Claudius Cæcus, best known for a story told to explain his defeat, in 249 B.C., by the Carthaginians in a naval battle in the harbor of Drepanum. When, before the battle, he sought the *auspicia ex tripudiis* (see AUGURIES and AUSPICES), the sacred chickens refused to eat. Undeterred by this evil omen, he flung the chickens into the sea, crying, "Let them drink then." He died before 246 B.C.

CLAUS, klous, KARL FRIEDRICH WILHELM (1835–99). A German zoölogist, born in Cassel. He studied the natural sciences in Giessen, under Leuckart; in 1863 became professor of zoölogy in Marburg, in 1870 in Göttingen, and in 1873 in Vienna. He was also director of the zoölogical station at Triest. He was very active in the investigation of the Crustacea and is also widely known because of his *Text-Book of Zoology*. Of his numerous works the following are important: *Die freilebenden Copepoden* (1863); *Beitrage zur Kenntnis der Ostracoden* (1868); *Grundzuge der Zoölogie* (1868); *Ueber den Bau und die Entwicklung der Cumaceen* (1870); *Die Metamorphose der Squilliden* (1872); *Ueber die Entwicklung, Organisation und systematische Stellung der Arguliden* (1875); *Lehrbuch der Zoologie* (6th ed., 1897; trans. into English, under the title of *Text-Book of Zoology*, by Claus and Sedgwick, London, 1897).

CLAUSEL, klō'zĕl', BERTRAND (1772–1842). A French marshal, born at Mirepoix, in the Department of Ariège, Dec. 12, 1772. He entered the army at an early age and commanded a brigade in the Italian campaign of 1799. He was made a general of division of the Army of the North in 1802, distinguished himself in the campaign of 1809 against Austria and subsequently in the war in Spain, where, after the battle of Salamanca, July 22, 1812, he succeeded Marmont in the chief command. He conducted the very difficult retreat from Portugal with the greatest circumspection, fighting a succession of battles. Although he stood by Napoleon to the last, Louis XVIII, in 1814, named him inspector general of infantry. When Napoleon returned to France in 1815, Clausel immediately declared for him, was made a peer, and received the command of the Army of the Pyrenees. On the return of the Bourbons he was declared a traitor. He escaped to the United States and lived several years at Mobile, where he wrote his *Exposé justificatif*. During his absence he was condemned to death, but was subsequently permitted to return to France, was elected deputy in 1827 and 1830, and after the July revolution was put in command of the troops in Algeria. For his services in that capacity he was made marshal of France in 1831, but was soon afterward recalled. He was appointed Governor-General of Algeria in 1835 and once more recalled in 1837. He returned to France and defended himself, though not quite successfully, both through the press and from the tribune, against the attacks made upon him. He died at Secourrieu (Haute-Garonne), near Toulouse, April 21, 1842. Consult Clausel, *Explications du Maréchal Clausel* (Paris, 1837). See ALGERIA.

CLAUSEN, GEORGE (1852–). An English genre, landscape, and portrait painter. He was born in London of Danish parents, studied at the South Kensington Art Schools, was assistant to the painter Edwin Long, and afterward worked under Bouguereau and Fleury at Paris. His early pictures show the influence of various models—"La Pensee" (1880, Glasgow Museum) for instance, that of Whistler—but after a visit to Paris in 1883 he adopted the plein-air methods of Bastien-Lepage, and gradually developed an individual style with peculiarly beautiful atmospheric effects, which has placed him in the front rank of English painters with Impressionistic tendencies. His pictures usually depict the life of the English country laborer with a style of poetic conception closely approaching Millet's. Among the best known are: "The Ploughboy" (1888); "The Girl at the Gate" (1889, Tate Gallery, London); "The Mowers" (1892, Sharpley-Bainbridge collection, Lincoln); "The Ploughman's Breakfast" (1905, Melbourne Gallery); "The Gleaners Returning" (1908, Tate Gallery); "Twilight" (1909). He became known also as a painter of portraits and still life. Clausen received many medals, was elected a member and served for a time as professor in the Royal Academy. His lectures were published under the titles *Six Lectures on Painting* (1904), and *Aims and Ideals in Art* (1906).

CLAUSEN, klou'zen, THOMAS (1801–85). A German astronomer, born at Nübel, in Schleswig. He early devoted himself to the study of astronomy, was for several years assistant at the observatory of Altona, and from 1842 to 1872 was connected with the observatory of Dorpat (now Yuryev), first in the capacity of observer, later as director. During his scientific career Clausen made many important contributions to astronomy and carried out elaborate calculations of the paths of comets.

CLAUSENBURG, klou'zen-burk. See KLAUSENBURG.

CLAUSEWITZ, klou'ze-vĭts, KARL VON (1780–1831). A Prussian general and military writer, born at Burg. He entered the army in 1792, took part in the campaigns on the Rhine in 1793–94, and in 1801–03 attended the Berlin Academy for young officers, where he attracted the attention and won the favor of Scharnhorst.

He was adjutant to Prince Augustus in 1803–06, was captured with him by the French at Prenzlau, and, after being exchanged, served until 1812 as major in the Prussian General Staff, being employed after 1809 in the Ministry of War, under Scharnhorst. In 1810–12 he was military instructor to the Crown Prince of Prussia and to Prince Frederick of the Netherlands. At the outbreak of the Russian War in 1812 he entered the Russian service and aided Diebitsch in concluding the convention of Tauroggen. He accompanied Blücher as Russian staff officer during the campaign of 1813, the history of which he wrote, at the instance of Gneisenau. He reëntered the service of Prussia in 1814, was appointed chief of staff under Thielmann in the following year, and remained in that position at Coblenz until 1818, when he was made major general and director of the Allgemeine Kriegsschule. Finally, he was appointed, in 1831, chief of staff to Field Marshal Gneisenau and served first in Berlin, then on the Polish frontier. His writings are marked by keen analytic power, e.g., in his famous analogy between war and unrestricted competition in business. They were published after his death as *Hinterlassene Werke uber Krieg und Kriegfuhrung* (10 vols., 1832–37), of which the most noteworthy are: *Vom Kriege* (3 vols., Eng. trans. by Graham, *On War*, London, 1873); *Der Feldzug von 1796 in Italien; Uebersicht des Feldzuges von 1813; Der Feldzug von 1815; Ueber das Leben und den Charakter von Scharnhorst.* Consult Schwartz's biography (2 vols., Berlin, 1877).

CLAUSIUS, klou'zê-us, RUDOLF JULIUS EMANUEL (1822–88). A German physicist, born at Köslin. In 1855 he became professor in the Polytechnic Institute of Zurich, in 1867 professor in the University of Würzburg, and in 1869 professor at Bonn. Clausius is one of the founders of the modern science of thermodynamics (q.v.), and in a paper before the Berlin Academy of Sciences (1850) stated the second law of thermodynamics, that "heat cannot of itself pass from a colder to a hotter body." The theory of electrolysis advanced by Clausius has also played a conspicuous part in electricity. He assumed that the ions are not in complete union, but that a part of them are free to unite with other ions. These uncombined ions, accordingly, are brought together under the action of the current at the anode and cathode. Clausius was one of the most celebrated mathematical physicists of the nineteenth century, and his researches and writings in heat, electricity, and molecular physics were of the greatest value. His most important works are: *Die mechanische Warmetheorie* (1876); *Die Potentialfunktion und das Potential* (1859); and *Ueber das Wesen der Wärme, verglichen mit Licht und Schall* (1857). For a biography of Clausius, consult Riecke, *Rudolf Clausius* (Göttingen, 1889).

CLAUSON-KAAS, klou'zôn-käs', ADOLF VON (1826–1906). A Danish promoter of manual training. He was born near Altona, Holstein, and, after serving in the Danish cavalry, devoted himself entirely to the advancement of education. In 1870 he founded the Danish Clubs for Home Industry. On the occasion of the international expositions of 1873 and 1878, he gave a series of public lectures on manual training in several cities of Germany, Holland, Russia, France and elsewhere, and also established a series of teachers' courses. In this way he encouraged the revival of working schools for boys, his primary aim being the mechanical development of the hand and of the eyê in association with mental training. He conducted a number of training schools in Saxony and introduced a course of modeling and drawing in the institution for the blind at Dresden.

CLAUSS-SZAVARDY, WILHELMINA (1834–1907). One of the great pianists of the last century. She received her entire musical education at the Proksch Institute in her native city, Prague. When only 15 years old, she made her first tour of Germany and attracted considerable attention. In spite of the interest Berlioz showed in her she did not immediately succeed in Paris; but when the singer Madame Ungher-Sabastier took her under her special protection, she conquered Paris and from there in a short time France, Germany, and England. She was especially great as an interpreter of Bach and Beethoven. In 1857 she was married to the author Frederick Szavardy, who died in 1882. After 1852 her home was in Paris.

CLAUSTHAL, klous'tâl (Ger., closed valley, from Lat. *clausum*, p.p. of *cludere*, to close + Ger. *Thal*, valley). An important mining town in the Prussian Province of Hanover, situated on a plateau of the Upper Harz Mountains, about 1800 feet above sea level, and 25 miles northeast of Göttingen (Map: Prussia, D 3). It forms practically one town with Zellerfeld, which contains the Upper Harz Museum. Among its public buildings the most noteworthy is the church of the Holy Ghost, the largest wooden church in the world. The mines of Clausthal yield silver, lead, copper, iron, and zinc, and are among the most valuable and productive in Germany. They are owned and operated by the Prussian government, which has established in connection therewith a mining academy, with an experimental laboratory, model workshop, and a library of over 40,000 volumes; the number of its students in 1913 was 138. The greater portion of the male population finds employment in the mines and smelting works, while the women are occupied in the knitting mills. Pop., 1900, 8565; 1905, 8632; 1910, 8266. Clausthal was founded in the twelfth century, and a new settlement was established there by the dukes of Brunswick in the sixteenth century.

CLAVA'RIA (Neo-Lat. nom. pl., from Lat. *clava*, club). A genus of fungi belonging to the Hymenomycetes. They are known in general as the coral fungi, their fleshy sporophores often simulating branching coral in form. The spores are produced over the whole surface of the branches. There are also forms with unbranched, club-shaped sporophores. Some of the forms are edible and seem to be used in Germany more than in other countries. *Clavaria botrytis*, a species common in oak and beech woods, growing on the ground among moss, grass, heath, etc., is gathered when young, and used as food, having a very agreeable sweetish taste. Another German species, *Clavaria flava*, which grows on sandy ground in fir woods, is used in the same way. Other species appear to possess similar properties, and Liebig found them to contain the saccharine substance called "mannite." *Clavaria botrytis* is the *Keulenpilz*, and *Clavaria flava* the *Ziegenbart* (goat's beard) of the Germans. See Colored Plate of EDIBLE FUNGI accompanying the article FUNGI.

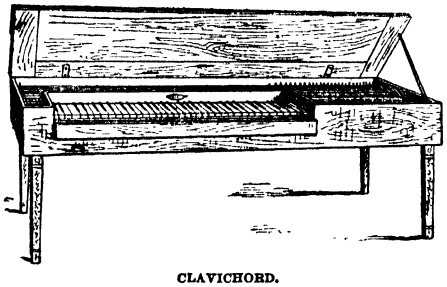
CLAVENNA. See CHIAVENNA.

CLAVERACK, klăv'ĕr-ak. A town in Co-

lumbia Co., N. Y., including Philmont village, 30 miles south of Albany, and 3 miles east-southeast of Hudson, its banking point, on the Boston and Albany Railroad (Map: New York, G 6). Among the points of interest are a Dutch Reformed Church, built in 1767, an old court-house, erected in 1784, a home for crippled children, public library, and *Tribune* Fresh Air Home, for children. The chief industries are agriculture and the manufacture of flour and farm implements. Settled as early as 1660, Claverack (named "Klauver Rachen," 'clover reaches,' by the Dutch) was organized as a town in 1778 and was the county seat from 1786 to 1806. The government is administered by town meetings, held every two years. Pop., 1900, 4416; 1910, 4114.

CLA'VERHOUSE. See GRAHAM, JOHN.

CLAVICHORD, klăv'ĭ-kôrd (Fr. *clavicorde*, ML. *clavichordium*, from Lat. *clavis*, key + *chorda*, string). An instrument of the harpsichord family and an important step in the evolution of the pianoforte. Its history previous to the fifteenth century is unknown, but it is generally believed that the instrument originated by applying to the monochord (q.v.) the keyboard of the organ. The clavichord was shaped like the square pianoforte, having a keyboard of



CLAVICHORD.

four octaves and strings of brass wire set in vibration by the action of tangents or "jacks" covered with metal. Its tone, though weak, was delicate, and, unlike the harpsichord, or spinet, in which the strings were plucked or twanged by quills or pieces of hard leather, it responded in a measure to the gradations of the player's touch. The clavichord was used in Germany until the beginning of the nineteenth century. Bach preferred it to the pianoforte of his day and wrote an essay for his son, *Versuch über die wahre Art Klavier zu spielen*, for this instrument. Mozart used the clavichord in composition, and Beethoven preferred it to other keyed instruments, for upon it, he said, "one could best control tone and expressive interpretation." As recently as 1896 Mr. Arnold Dolmetsch of Boston had several clavichords built after old models for use in his concerts of ancient music. Consult: A. J. Hopkins, *Old Keyboard Instruments* (London, 1887); K. Krebs, *Die besaiteten Klavierinstrumente bis zum Anfang des 17 Jahrhunderts* (Leipzig, 1892); F. A. Goehlinger, *Geschichte des Klavichords* (Basel, 1910). See HARPSICHORD; SPINET.

CLAV'ICLE (Lat. *clavicula*, a little key, dim. of *clavis*, key), or COLLAR BONE. A long bone, curved somewhat like the italic letter *f*, and placed at the upper and anterior part of the thorax, in a nearly horizontal position. In connection with the scapula or shoulder blade, the clavicle forms the shoulder and is the only bony connection between the upper extremity and the trunk. The inner extremity of the clavicle articulates with the sternum (breastbone) and the cartilage of the first rib, while the outer extremity articulates with the scapula. The range of motion in the clavicle is extensive—especially in a vertical direction—and the various movements of the arm are in this way readily accommodated. In the female the clavicle is smoother, slenderer, and presents a less marked curve than that of the male. The length, also, is slightly less, and the position more nearly horizontal. Manual labor, which brings the shoulder into constant exercise, renders the clavicle thicker and tougher, and therefore in right-handed people the right clavicle shows greater development.

Since the clavicle favors the lateral movements of the upper extremities, we do not find it in animals whose fore limbs are used only for progression; but it is present in almost all animals whose anterior extremities are clawed and used for prehension.

The clavicle is frequently fractured by direct violence and also by indirect force, as in falling upon the hand. Dislocations are of less frequent occurrence.

Ossification of the clavicle begins very early—even as soon as the thirtieth day, according to Béclard—and at birth this process is almost complete.

CLAVIER, klȧ-vēr' (from Lat. *clavis*, key). The German name for the pianoforte, and the prototype of the clavichord (q.v.). In French, "clavier" designates the keyboard of an organ or pianoforte. For the practice clavier, see PIANOFORTE.

CLAVIGO, *Span. pron.* klä-vē'gō. A play by Goethe (1774), based on an episode in the life of José Clavijo y Fajardo, a Spanish official and journalist.

CLAVIJERO, or **CLAVIGERO,** klä'vê-hā'rō, FRANCISCO XAVIER (1731-87). A Mexican historian, born in Vera Cruz. He early entered the Order of the Jesuits and became a teacher of rhetoric and philosophy. He lived among the Indians in various parts of Mexico as a missionary for many years and made himself fully acquainted with the languages, traditions, and antiquities of the aboriginal tribes. On the expulsion of the Mexican Jesuits by Spain, in 1767, he sailed for Italy, and with others of his order settled in Ferrara, passing later to Bologna, where he founded an academy. He wrote, in Spanish, a work on early Mexican history; but, in order to publish it, he was obliged to translate it into Italian. The work finally appeared as *Storia antica del Messico* (1780); it is a comprehensive and valuable history of the Aztec period. An English translation was made by C. Cullen (London, 1787; 2d ed., ib., 1807). Clavijero also wrote works on physics and philosophy, and the *Storia della California* (1789), which was translated into Spanish by Nicolás García de San Vicente, as *Historia de la Antigua ó Baja California* (Mexico, 1852).

CLAVIJO, RUY GONZÁLEZ DE (?-1412). A Spanish traveler in the Orient. He was born in Madrid and in 1403 was sent by Henry III of Castile as Ambassador to Tamerlane. The route followed by him from his point of departure, Cadiz, took him to Trebizond, Armenia, Persia, and Khorasan. He arrived at Samarkand in 1404 and was well received at the court of Tamerlane. The return journey was accom-

plished (partly after the death of Tamerlane) amid the greatest dangers and difficulties. Upon his arrival in Spain in 1406 he reported at once to the King, whose court was then at Alcalá de Henares, and served thereafter as chamberlain, until the King's death in 1407. The "journal" of Clavijo was published under the title *Historia del gran Tamerlán é itinerario y narración del viaje*, etc. (1582; reprinted in 1782). It is valuable, not only because of its high literary merit, but also for its historical importance. There are editions, equipped with dissertations and notes, by Gonzalo Argote de Molina (Sevilla, 1582) and Antonio de Sancha (Madrid, 1782). An English version by Sir Clements Markham bore the title *Narrative of the Embassy of R . . . G . . . de Clavijo to the Court of Timour* (Hakluyt Society, 1859).

CLAVILEÑO, *Sp. pron.* klä'vē-lā'nyō, EL ALIGERO. The wooden horse, said to have been constructed by Merlin, which was managed by a wooden pin in its forehead; whence its name, "the winged pin timber."

CLAXTON, KATE (MRS. CHARLES A. STEVENSON) (1850–). An American actress, born at Somerville, N. J. She made her first appearance on the stage in Chicago with Miss Lotta in 1870, and in the same year joined Augustin Daly's Fifth Avenue Theatre in New York. In 1872 she became a member of A. M. Palmer's Union Square Theatre, playing largely comedy rôles. She created the part of Louise in *The Two Orphans* and then became known as one of the best emotional actresses of her time. Her first starring tour was in 1876. In 1878 she was married to Charles A. Stevenson.

CLAXTON, PHILANDER PRIESTLY (1862–). An American educator, born in Bedford Co., Tenn. He was educated at the University of Tennessee and at Johns Hopkins. From 1883 to 1893 he was a superintendent of schools in North Carolina. In the latter year he became professor of pedagogy and German at the North Carolina State Normal and Industrial College, and in 1896 director of that institution's Practice and Observation School. From 1902 to 1911 he was professor of education, and from 1906 to 1911 also professor of secondary education and inspector of high schools at the University of Tennessee. He was also editor of the *North Carolina Journal of Education* (1897–1901) and of the *Atlantic Educational Journal* (1901–03), and was superintendent of the Summer School of the South from 1902 to 1911. In the latter year he was appointed United States Commissioner of Education.

CLAXTON, THOMAS FOLKES (1874–). An English astronomer, born in London. In 1890 he became an assistant at the Royal Observatory, Greenwich, and after one year (1895) as assistant director of the Royal Alfred Observatory, Mauritius, he served as director until in 1912 he went to Hongkong to be director of the Royal Observatory there. His publications include: *Annual Magnetic and Meteorological Observations, Mauritius* (1896–1910); *Seismological Observations* (1898–1910); "Magnetic Survey, Pamplemousses," in the *Proceedings of the Royal Society*, vol. lxxvi (1905).

CLAY (AS. *clæg*, Ger. *Klei;* ultimately connected with Lat. *glus, gluten*, glue, Gk. γλοιός, *gloios*, gum, OCh. Slav. *glĕnŭ*, slime). A term applied to earthy material or soil which shows plasticity when wet, thus permitting it to be molded into any desired form, which it retains when dry. Its distinguishing character is a physical one; for clay varies widely in other respects, being made up of fine mineral fragments, the most prominent of which may be the mineral kaolinite, a hydrated silicate of alumina. Clay is formed primarily by the decomposition of feldspathic or other silicate rocks in situ; such a clay is said to be *residual* in its nature and shows a gradation into the parent rock below. Residual clays from limestone are formed by a leaching out of the lime carbonate, the clayey impurities of the rock being left behind, and in these there is no transition zone. The residual material is often washed down into the lakes or ocean by the surface waters and there spread out over the bottom as an aluminous sediment; such a clay deposit being known as a *sedimentary* one, which is not only stratified, but may also be more extensive than a residual. Sedimentary clay sometimes becomes consolidated by the pressure of other sediments which have been deposited on top of it, and it is then termed shale. These shales, on grinding and mixing with water, develop the same plasticity as does soft clay. Glacial clays, while of transported character like the other sedimentary ones, consist of a variable mixture of ground-up rock flour and residual material gathered up by the ice.

The chief chemical constituents of clay are silica and alumina; but, in addition to these, variable quantities of iron oxide, lime, magnesia, alkalies, water, and even rarer substances are often present. These ingredients affect the physical properties of the clay; such as its color when burned, air and fire shrinkage, refractoriness, plasticity, and thus indirectly its uses. The lime, magnesia, iron oxide, and alkalies exert a fluxing action in burning, and the greater their quantity the lower the fusing point of the clay. Silica decreases the air and fire shrinkage of a clay, while alumina and water have the reverse effect.

The property of plasticity, together with that of hardening under fire, makes clay an article of great value in the plastic arts. Those clays which are low in plasticity are said to be "lean," while the highly plastic varieties are "fat." It is now believed that the plasticity depends in part on the fineness of grain and in part on the amount of colloidal substances present. Clay does not fuse suddenly, but softens gradually under the influence of heat. In very fusible clays this sintering may begin at 1500° or 1700° F., while in very refractory kinds it does not take place until a temperature of 3000° F. or more is reached. The red color of a burned clay is due to considerable iron oxide, while buff is produced by a small quantity of iron or by an excess of lime. The following table gives the composition of several grades of clay:

	1	2	3	4	5	6
	%	%	%	%	%	%
SiO_2	62.40	45.78	54.23	68.54	63.31	60.59
Al_2O_3	26.51	36.46	32.80	18.49	16.57	12.46
Fe_2O_3	1.14	1.08	.21	3.38	4.06	5.79
CaO	.86	.50	....	1.03	1.11	6.84
MgO	.01	.04	....	.88	1.10	3.28
Alkalies	.10	.25	....	2.37	3.16	4.39
H_2O	13.35	13.40	11.24	4.62	6.89	4.36
Moisture	....	2.05	....	1.52	3.76	1.46

(1) Crude kaolin, Webster, N. C.; (2) Washed kaolin, Webster, N. C.; (3) Fire clay, Wymp's Gap, Pa.; (4) Paving-brick shale, Kansas City, Mo.; (5) Brick clay, Indianola, Iowa; (6) Calcareous slip clay, Albany, N. Y.

Clay is used in the manufacture of common, pressed, and paving brick; terra cotta, fireproofing, terra cotta lumber; roofing, floor, and glazed tile; fire brick, retorts, crucibles, muffles, and other refractory goods; all grades of pottery, stoves, sewer pipe, door knobs, electrical insulators, turbine wheels, closets, bathtubs, and washtubs; filters, mineral paint, food adulterants, Portland cement, paper fillers, emery wheels (as a cement therein), ultramarine, modeling, soap, etc.

Clay is widely distributed geographically, and also geologically, i.e., in the formations of different ages. In the United States deposits are found at a great number of localities. The Cretaceous clays of New Jersey are much used in the manufacture of refractory goods, while the Carboniferous clays of Pennsylvania and Ohio are extensively employed for making fire brick. In Colorado and California the Cretaceous and Tertiary formations are worked at many points for fire clays. Kaolin is quarried at several points in North Carolina and Georgia; much white ball clay is found in Florida, Tennessee, and Kentucky, and stoneware clay in Illinois and Missouri. Clays suitable for brick, terra cotta, and sewer pipe occur at many points all over the United States. In the Central States clays suitable for the manufacture of vitrified paving brick are actively worked. With all this supply, however, much ball clay and kaolin is imported, the material coming chiefly from England. Over $172,000,000 worth of clay products are produced annually in the United States alone.

The different varieties of clay are as follows:

KAOLIN (q.v.) or CHINA CLAY. A white-burning clay, used in the manufacture of porcelain and white earthenware. It is of residual origin and often occurs in the form of veins.

FIRE CLAYS (q.v.). Clays containing a low percentage of fluxes and hence capable of resisting high temperatures. They are used in the manufacture of all classes of refractory goods and sometimes also for making pressed brick and terra cotta.

FLINT CLAY. A dense, hard, nonplastic fire clay, found chiefly in the Carboniferous formations of Pennsylvania, Ohio, and Kentucky.

PIPE CLAY. A term applied to many smooth, highly plastic clays.

BRICK CLAY. A term including almost any impure clay which can be molded into bricks.

TERRA-COTTA CLAY. A grade of clay used for making terra cotta (q.v.). It includes many varieties.

SLIP CLAY. An easily fusible clay, which melts to a translucent glass and is used for glazing the cheaper grades of pottery.

POTTERY CLAY. A term applied to any clay used in the manufacture of pottery.

SAGGAR CLAY. A grade of fire clay used for making saggars, or vessels in which fine pottery is placed during baking in the kiln.

ALUM CLAY. A clay containing a large amount of alum.

MARLY CLAY. A clay containing from 20 to 30 per cent of lime carbonate.

GUMBO CLAY. A very plastic, sticky clay, found in many localities in the Central States and often used in the manufacture of railroad ballast.

BALL CLAY. A plastic, white-burning clay, used as a bonding ingredient in white ware and porcelain bodies.

PAPER CLAY. One of very fine texture and white color, used for filling paper.

ADOBE. A sandy, often calcareous, clay used in the West and Southwest for making sun-dried brick.

Clay Mining and Working. Deposits of clay and shales lying at or near the surface are worked as open pits. The surface dirt is first removed by digging, scrapers, steam shovels, or hydraulicking. The clay, if hard, is loosened by blasting and then dug by any of the methods (except hydraulicking) mentioned above. Beds of clay or shale lying under heavy overburden are worked by underground methods if the clay is of sufficient value to make such wares as fine brick, sewer pipe, or face brick.

Kaolins and some ball clays are put through a washing process to remove sandy impurities. This consists in dumping the clay with plenty of water into a disintegrating machine, from which the water and suspended clay traverse a great length of troughing, in which the sand settles out and finally reaches the settling tanks. Here in quiet water the clay settles to the bottom of the vat. The supernatant water is drawn off, and the creamy mixture of clay and water in bottom is forced by means of pumps into filter presses, where the water is squeezed out. The clay is then dried and shipped to market.

Clay working or tempering of some sort is generally required before clay can be used, and particularly before it can be molded into brick, pottery, sewer pipe, or tiles. Reduction to a plastic state may be effected by wet or dry grinding, screening, pugging, washing, or by the more natural process of weathering; or a combination of two or more of these methods may be employed. The screening and washing may be so arranged as to remove foreign material. It must be understood that the term "clay working," as here used, is limited to the preparation of the raw material for molding or forming, the other processes being treated separately, under the various clay products, as will be the matter of drying; while burning, for the most part, will be discussed under KILN.

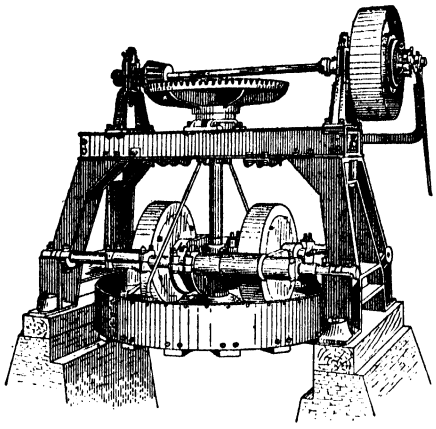
Weathering is a self-explanatory term. The time involved may range from months to years, but is more often the shorter period. With improvements in machinery and methods, less dependence is placed on this process than formerly.

Soaking, like weathering, is a natural process, but it is now used only under primitive conditions, and where the clay is molded in a soft form, without other working. The clay is simply shoveled into pits, say 4 × 6 feet in extent, and soaked in water over night.

Ring pits are 25 to 30 feet in diameter, 3 feet deep, lined with brick or boards. An iron wheel is passed over or through the clay, back and forth, mixing in the sand, in case any is used. Clay for some 30,000 bricks may be tempered in six hours.

Grinding is accomplished by passing the clay between rolls, or in dry pans, the former process being particularly applicable to shales. The pans are 7 to 9 feet in diameter, with perforated floors, through which the material falls as soon as it has reached the desired fineness. The pan revolves horizontally and by means of friction motion is imparted to two iron wheels, mounted

in the pan, 6 to 14 inches wide, weighing 2000 to 6500 pounds each. A pan with one-eighth-inch holes has an average capacity of 100 tons of clay per day of 10 hours.

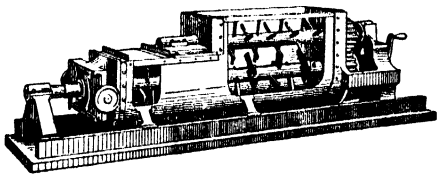


DRY-PAN CLAY-GRINDING MACHINE.

Screening is sometimes employed for clay which has passed the dry pan. Screens may be inclined sieves, either fixed or shaking, and rotary cylindrical or octagonal in form. Some demand much attention to prevent clogging, and require heavy repairs, but nevertheless are cheap and simple in operation.

Wet pans are much like dry pans, only their bottoms are not perforated, and scrapers are placed in front of the wheels, to throw up the clay. They may be discharged through a trap-door or by means of an automatic shovel. One of their chief advantages is rapidity, only two or three minutes being required to temper a charge for brick and four or five minutes for sewer pipe.

Pug mills appear to be used more than other classes of tempering machines. They are either vertical or horizontal, but in either case they have a central revolving shaft, fitted with radial knives extending nearly to the surrounding cylinder in which the clay is placed. The knives



PUG MILL FOR MIXING CLAY.

force the clay forward, as well as work it thoroughly, and by changing the angle of the adjustable knives the speed of the passing clay may be regulated. Water is admitted as desired and needed. Pug mills are compact and require less power than ring pits.

Bibliography. Ries, *Clays, Occurrence, Properties, and Uses* (New York, 1908); Rohland, *Die Tone* (Leipzig, 1909); Prime, *Pottery and Porcelain of All Times and Nations* (New York, 1878); Barber, *Pottery and Porcelain of the United States* (ib., 1901); Searles, *Modern Brickmaking* (ib., 1911); Bourry, *Treatise on Ceramic Industries* (ib., 1911); Binns, *The Potter's Craft* (ib., 1910); Merrill, *Rocks, Rock Weathering, and Soils* (ib., 1906); Ries and Leighton, *History of Clay-Working Industry in United States* (ib., 1909); many technical papers in *Transactions of American Ceramic Society* (Columbus, Ohio). For statistics, see United States Geological Survey, *Mineral Resources*, published annually. Special reports dealing with their clay resources have been issued by the Geological Surveys of Alabama, Connecticut, Georgia, Illinois, Indiana, Iowa, Maryland, Mississippi, Missouri, New Jersey, New York, North Carolina, North Dakota, Ohio, Oklahoma, South Carolina, Texas, Virginia, Washington, West Virginia, and Wisconsin. See ALUMINA; SHALE; PIPE CLAY; KAOLIN; LOAM; SOIL; BRICK.

CLAY, ALBERT TOBIAS (1866–). An American Semitic archæologist, born in Hanover, Pa. He graduated at Franklin and Marshall College in 1889 and at the Lutheran Theological Seminary in 1892; was ordained to the Lutheran ministry in the latter year; was fellow in Assyrian and instructor in Hebrew at the University of Pennsylvania, to which, after being instructor in Old Testament theology at the Chicago Lutheran Seminary in 1895–99, he returned as lecturer in Semitic archæology. He was assistant professor of Semitic philology and archæology there in 1903–09, and full professor for one year; and in 1910 became Laffan professor of Assyriology and Babylonian literature. His most important publications were Babylonian business and legal documents, especially *Business Documents of Murashû Sons of Nippur* (1898 et seq.). Clay also wrote "Personal Names," an article in *Studies in Memory of W. R. Harper from Cuneiform Inscriptions of the Cassite Period* (1912), and in an article (1908) on Aramaic indorsements on these documents he points out the value of Aramaic transliterations of Babylonian proper names. His *Amurru, the Home of the Northern Semites* (1909) shows the non-Babylonian origin of Israelite culture and religion.

CLAY, BERTHA M. The pen name of THOMAS W. HANSHEW (q.v.).

CLAY, CASSIUS MARCELLUS (1810–1903). An American abolitionist and politician, born in Madison Co., Ky. He graduated at Yale in 1832, returned to Kentucky to practice law, and was elected to the State Legislature in 1835, in 1837, and in 1840, but in 1841 failed of reëlection on account of his strong antislavery opinions. In 1844 he made speeches in the Northern States in advocacy of the election of Henry Clay to the presidency, and in the following year opposed the annexation of Texas and established at Lexington, Ky., the *True American*, a vigorous antislavery paper, which, however, was suppressed by a mob, but was revived by Clay and was published thereafter in Cincinnati. He volunteered for service in the Mexican War in 1846 and was taken prisoner. In 1850 he left the Whig party and was the antislavery candidate for Governor. In 1860 he supported Lincoln and in 1861 was appointed Minister to Russia, but returned to the United States in 1862 and was made major general of volunteers. In 1863, however, he resigned and was again appointed Minister to Russia, where he remained until 1869. He supported Greeley in 1872 and Tilden in 1876, but went over to the Republican party to vote for Blaine in 1884. In the campaign of 1896 he was in the gold-standard wing of the Democratic party. Consult Greeley, *The*

Life, Memoirs, Writings, and Speeches of Cassius Marcellus Clay (2 vols., Cincinnati, 1886).

CLAY, CLEMENT CLAIBORNE (1819–82). An American politician, born at Huntsville, Ala. He graduated at the University of Alabama in 1835 and was admitted to the bar in 1840. From 1842 to 1845 he was a member of the State Legislature, from 1846 to 1848 was judge of the Madison County Court, and in 1853 was elected to the United States Senate. Upon the secession of his State he withdrew from the Senate and was forthwith elected to the Confederate Congress. Having taken refuge in Canada at the overthrow of the Confederacy, he later gave himself up, and in 1865–66 was imprisoned at Fortress Monroe with Jefferson Davis.

CLAY, GREEN (1757–1826). An American soldier. He was born in Powhatan Co., Va., became a pioneer settler in Kentucky, then a part of Virginia, about 1776, represented the district for some time in the Virginia Legislature, and was a member of the State Constitutional Convention of 1799. In 1813 he led the force of 3000 which relieved General Harrison, then besieged by the British and Indians at Fort Meigs, and afterward defended that fort against General Proctor and Tecumseh. He was the father of Cassius Marcellus Clay and a cousin of Henry Clay. See FORT MEIGS.

CLAY, HENRY (1777–1852). A noted American statesman and party leader, born on April 12, 1777, in a district known as the "Slashes," in Hanover Co., Va., whence he derived his first popular nickname of "The Mill Boy of the Slashes." His father was a Baptist clergyman, who died when young Clay was only four years old. His mother soon after married again, and her second husband, one Henry Watkins, placed Clay in a retail business house in Richmond, where he remained for four years (1791–95). He showed much diligence in his daily work, but read assiduously during his leisure hours. He was one of seven sons, but he alone manifested, at an early age, qualities of mind which attracted the notice of all who met him. Consequently he was employed by Chancellor George Wythe of the High Court as an amanuensis, and his quick intelligence led his accomplished employer to recognize great possibilities in the youth. His intercourse with Wythe did a great deal to stimulate Clay's natural ambition and to lay the foundation of his subsequent career as a party leader. Clay's personality was, even at this time, remarkable. With no physical attractions, he nevertheless possessed that indescribable quality called magnetism, and this was destined to win for him the intense devotion of a great party and the liking of a host of his countrymen. In Richmond he pursued some desultory studies and a special course of one year in the office of Attorney-General Brooke. He mastered so readily the principles of law that he was admitted to the bar at the age of 20, when he left Richmond and began practice in Lexington, Ky., at that time a frontier "city." Clay afterward regretted what he called his "neglected education" and the lack of systematic instruction. However, among the pioneers and frontiersmen these defects were not perceptible, and, compared with associates, Clay was well read. His boldness, ardor, and frankness soon won him a host of friends, and he soon attained more than a local reputation as a jury lawyer. Naturally enough, he entered politics and in 1799 was a member of the convention which revised the constitution of the State. It is to be noted that here he first took a definite stand, with some loss of personal prestige, in opposing the perpetuation of slavery. He soon regained his popularity, however, by his effective attacks upon the much-hated alien and sedition laws (q.v.). In the year last mentioned he married Miss Lucretia Hart, whose father was a man of some wealth and social standing, and this marriage gave him a certain independence as well as domestic happiness. By his wife he had 11 children, to whom he showed himself always a devoted father. About the year 1800 he purchased an estate of 600 acres near Lexington, to which he gave the name of Ashland, and which for 50 years was destined to be a sort of Mecca to political pilgrims on every kind of errand. Here he kept open house, gained more and more reputation as an orator and a lawyer, and finally gave up criminal practice, which was always distasteful to him, the more so because of his success in defending persons accused of murder, not one of whom was ever convicted as soon as Clay appeared in his behalf. As Clay once said himself, "I fear that I have saved too many who ought to be hanged."

From defending criminals, Clay became the public prosecutor; but in 1803 he was sent to the Kentucky Legislature. In 1806 he was appointed to fill an unexpired term in the United States Senate, where at once he became a national figure, showing great ability in debates and as a member of important committees. He advocated internal improvements at the national expense, the construction of great roads, the application of surplus revenue to promote public education and for the improvement and facilitation of every means of intercourse throughout the rapidly growing Republic. At this time Clay was described, by William Plumer of New Hampshire, as "intelligent, frank, and candid," "a man of talents," and also as "a man of pleasure—fond of amusements." Mr. Plumer's summing up is also interesting: "He declaims more than he reasons. He is a gentlemanly and pleasant companion, a man of honor and integrity." Clay's term lasted for only a few months; and he declined to be a candidate for the next Congress, preferring to continue his practice of law in Kentucky. He had already appeared before the Supreme Court of the United States and was now widely known. In 1808 he was reëlected to the State Legislature, where he became Speaker. It was in no spirit of localism, however, that the body over which he presided was now to act. American feeling had been deeply stirred by the impressment and blockade policy of Great Britain; and in the South and West this feeling flamed out intensely. The Kentucky Legislature sought to pass a law providing that no decision of any British court nor any elementary British work on law should thereafter be cited as an authority. This resolution would certainly have been passed by an immense majority, had not Clay left the Speaker's chair and delivered an impassioned appeal which was never reported, but which has become traditional as an oration of remarkable power. Carl Schurz describes it as "saving for Kentucky the treasures of English jurisprudence." Nevertheless, Clay took the lead among those who favored a war with Great Britain, and he, with John C. Calhoun (q.v.), soon became known as "the War Hawks." He was personally involved in the first of several duels which he

was destined to fight, the most notable of them being his affair with the brilliant and irascible John Randolph (q.v.) of Roanoke. In 1809 Clay was again appointed to fill a vacancy in the United States Senate, where he continued his former policy and championed the protection of American industry, though he opposed the plan for chartering a United States Bank on the ground that such a measure was corrupt and unconstitutional—an opinion which he afterward reversed and thereby made himself much criticized for inconsistency.

In 1811 Clay was sent to the national House of Representatives, where he was immediately chosen Speaker. His bold and vigorous course did much to precipitate the War of 1812, for the prosecution of which he advocated an increase in the army and of other measures which greatly enhanced his popularity throughout the country. In 1814 he was one of the commissioners sent to negotiate a treaty of peace with Great Britain, being associated with John Quincy Adams, Bayard, Jonathan Russell, and Albert Gallatin. This commission succeeded in arranging the Treaty of Ghent (q.v.). Upon Clay's return in 1815 he received a magnificent reception from his countrymen, to whom peace was now as grateful as war had once seemed to be inspiring. Clay received the offer of a mission to Russia, but declined it so that he might enter once more the House of Representatives, to which he had been reëlected in his absence and of which he once more became Speaker. This office he preferred to a cabinet position which was tendered him, on the ground that it gave him a wider field as a party leader and for the advocacy of great measures which he viewed as essential to the future welfare of the United States. Clay, indeed, was one of the few statesmen of that time who had sufficient imagination to see the coming greatness of his country; and in this respect his political sagacity was even in advance of that of Daniel Webster (q.v.), whose intense nationalism was of slower, if of more steady and substantial, growth than Clay's. In 1816 Clay urged the passage of a moderately protective tariff bill and the resumption of specie payments; while with Calhoun he helped pass an act providing for internal improvements and succeeded in having it made a law over the veto of President Madison. When the Fifteenth Congress met in 1817, Clay was again chosen Speaker. He now ardently advocated the recognition by the United States of the South American republics which had declared their independence of Spain and of whose interest Clay remained consistently a vigorous champion. He continued to act as Speaker in the following Congress, where he was one of the few prominent statesmen who sharply criticized the administration of President Monroe during what was popularly known as "the Era of Good Feeling." In 1820 there was brought about the famous Missouri Compromise (q.v.), which for the time insured fairly harmonious relations between the North and the South. In 1821 Clay effected an arrangement by which Missouri might be admitted as a slave State, but on the understanding that citizens of other States should be permitted to settle in Missouri. These arrangements gave Clay a third popular nickname, "The Great Pacificator." Two years later, Clay refused a further reëlection to Congress and for a time engaged in highly profitable legal practice, being retained as permanent counsel for the Bank of the United States in Ohio and Kentucky. It was impossible, however, for Clay to remain long outside the sphere of national politics. In 1823 he was once more elected to the national House and was again chosen Speaker. He had long been regarded as an eligible candidate for the presidency, and in 1824 he became such a candidate, his competitors being Andrew Jackson (q.v.), William H. Crawford of Georgia, and John Quincy Adams. In the election no candidate received a majority of the electoral votes, Clay standing fourth upon the list. Therefore, when the election was thrown into the House, Clay's name could not be presented according to the Constitution, and he gave his personal support to Adams, who was chosen. Clay thereby gained the title of "President Maker." When Adams subsequently appointed Clay to be Secretary of State, a great outcry arose to the effect that Clay's appointment was the result of a corrupt bargain between himself and Adams—a charge which the character of the two men ought to have been sufficient to refute, but which, nevertheless, long cast a blight upon Clay's reputation for political integrity. It was then that John Randolph spoke of Clay's association with Adams as "a combination of the Puritan with the blackleg," a bitter denunciation which led to the duel between Clay and Randolph. This duel was fought with pistols, and at the first discharge neither combatant was wounded. Randolph refused to fire a second time, thus ending the encounter.

The secretaryship of state, formerly regarded as a stepping stone to the presidency, proved an obstacle to Clay, and though he made an excellent official, he regretted his long absence from Congress, where he could always lead. A strong opponent of General Jackson as a candidate for the presidency, he retired with Mr. Adams after the latter's defeat in 1829. Two years later, he was elected to the Senate. Here, in the difficult rôle of Senator and presidential candidate, he was prominent in his advocacy of the protective system, which he dubbed unreasonably, but successfully, the "American system." Unanimously nominated by the Whigs, Clay was overwhelmingly defeated by Jackson (1832), largely on account of his tariff theories, and his unwise choice, as a party issue, of the defense of the National Bank. When the Nullification (q.v.) controversy arose, Clay's compromise of 1833 prevented a resort to arms by satisfying South Carolina with regard to the reduction of the obnoxious tariff and rendering the Force Bill unnecessary. In the subsequent antislavery agitation he occupied a moderate position, but lost few opportunities of opposing the administration of Jackson. Throughout this period of his career Clay shared the honors of the Senate in its time of meridian glory with Daniel Webster, John C. Calhoun, and Thomas H. Benton (qq.v.).

During the Democratic administration of Martin Van Buren (q.v.) Clay led the opposition to an independent treasury system, though his opposition was unsuccessful. In 1840, much to his chagrin, he failed to receive the Whig nomination for the presidency, but loyally supported General Harrison, after whose election Clay endeavored successfully to repeal the subtreasury act, but was unsuccessful in his endeavor to have a new United States Bank incorporated. A law incorporating such a bank was passed by Congress, but was vetoed by President Tyler, who had succeeded Harrison on the latter's death.

Clay quite unwisely succeeded in forcing through both houses of Congress (1841) a bill providing for the distribution among the several States of the proceeds from the sale of public lands. When Tyler broke away from the Whig party which had elected him, Clay showed himself to be a great master of men; and he headed the Whigs in their bitter opposition to a President who was popularly regarded as a "renegade." He resigned his seat in the Senate (1842), and two years later was nominated for the presidency against James K. Polk of Tennessee. The presidency was lost to Clay because he had hesitated to take firm ground against the annexation of Texas. He was therefore opposed by the abolition party ("Liberty Party"), which supported James G. Birney (q.v.). Clay's defeat was extremely bitter to him and was absolutely crushing to those who had followed him so loyally and with so much ardent devotion for many years. Never again was there any real chance of his securing the one great prize for which he had contended; and, like Daniel Webster, he was doomed to disappointment in the Convention of 1848 which nominated General Taylor. In that year, however, he was reëlected to the Senate and did everything in his power to allay the increasing friction between the Northern and the Southern States, which grew fiercer and more intense after the close of the war with Mexico. Clay now showed himself a genuine patriot and lover of his country. He himself once said, "If any one desires to know the leading and paramount object of my public life, the preservation of this Union will furnish him the key." This sentence was strictly true; and his series of resolutions, which became known as the Compromise of 1850 (see COMPROMISE MEASURES), undoubtedly postponed for at least a decade the outbreak of a civil war. Clay, like Webster, was censured as showing weakness in his willingness to compromise; but time made clear the wisdom of his action. The country was not yet ready to pass through the storm and stress which came in 1861 and with which Abraham Lincoln had to deal. The 10 years which followed the great Compromise so strengthened the feeling of nationality which both Clay and Webster had done their best to foster and to stimulate as to make possible the preservation of the Union and the transformation of the United States into a compact and permanent political entity. By his eloquence and his grasp upon the imagination of his countrymen Clay stood forth as the embodiment of national unity, and for this he must always be remembered as one of the greatest of American party leaders. The principle for which he contended was positive and not negative, and he fought for it with all the ardor and brilliancy of his nature. His last speech in the Senate was on the subject of a revision of the tariff of 1846. Unable to occupy his seat for more than a few days of the session of 1851–52, owing to his failing health, he continued to the end to manifest an interest in public affairs. The last incident of importance in his career was his interview with Kossuth, when, a short time before his death, he warned the Hungarian patriot of the futility of soliciting the interference of the United States in the internal affairs of Europe and declared the true policy of this country in dealing with foreign nations to be that set forth by Washington in his Farewell Address. Sinking rapidly after this, he died in Washington, June 29, 1852, in the seventy-sixth year of his age.

Perhaps no American statesman has ever possessed so attractive a personality as Henry Clay. He lacked the grim determination of Andrew Jackson. He had not the depth nor the incisive logic of Webster. He must be held inferior to Lincoln in a certain indescribable instinct for the absolute right, even though he himself was the author of the famous saying that he would rather be right than be President. But there was about him a chivalrous gallantry, a fire, and an intensely magnetic quality that are very rare in men. His love of country cannot be questioned. His personal integrity was without a blemish. If he was not a strict moralist, he was at least a man of honor; and he was loved with a devotion that few men in American public life have ever won. Carl Schurz ranks him above Webster as an orator, yet this estimate is incorrect. Clay's speeches, so far as they have been preserved, do not explain the extraordinary effect which they produced in those who heard them. This effect must be ascribed less to the substance of what he said than to the power of his personality, whereas Webster both impressed his auditors by his presence and swayed them by a remarkable combination of clear thought and magnificence of diction. Clay never spoke such sentences as those which continue to thrill the reader of Webster's great reply to Hayne. He must therefore be set in the second rate of orators rather than in the first; yet the impression that he made on his contemporaries is described in Lincoln's dictum that Clay was "the *beau idéal* of a statesman."

Bibliography. For Clay's speeches and writings, see Colton, *The Life and Times of Henry Clay* in the revised edition (6 vols., New York, 1864). The standard biography is that of Schurz in the *American Statesmen Series* (2 vols., Boston and New York, 1887). For an estimate of his oratory, see H. T. Peck, "Some Notes on Political Oratory," in *The Personal Equation* (New York, 1898); and id., in G. R. Carpenter's *American Prose*, pp. 101 et seq. (last reprint, ib., 1913). On Clay in general, consult also: C. H. Peck, *The Jacksonian Epoch* (ib., 1906); Orth, *Five American Politicians* (Cleveland, 1906); the histories of Schouler and J. F. Rhodes; and H. T. Peck, *American Party Leaders*, chap. ii (New York, 1914).

CLAY'BORNE, WILLIAM. See CLAIBORNE, WILLIAM.

CLAY CENTER. A city and the county seat of Clay Co., Kans., about 80 miles (direct) west-northwest of Topeka; on the Republican River, and on the Union Pacific and the Chicago, Rock Island, and Pacific railroads (Map: Kansas, E 4). It contains two private hospitals, a Carnegie library, and a fine courthouse. The principal industrial establishments are flour mills, cigar, steel-tank, broom, and cement-block factories and brickworks. The city has good water power, which is utilized by the electric light and power plants, both of which are owned by the municipality. There are two large greenhouses, which make extensive shipments to all parts of the State. Pop., 1910, 3438.

CLAY IRONSTONE. The name applied to compact, argillaceous varieties of siderite, the carbonate of iron. It frequently occurs in the form of concretions, which may be so close to-

gether in some particular layer as to form a continuous band. They are especially abundant in some beds of the Carboniferous and at times serve as a low grade of iron ore. See IRON; BLACKBAND IRONSTONE.

CLAY MARL. A calcareous variety of clay, containing from 40 to 60 per cent of carbonate of lime. It is used as a fertilizer and also in the manufacture of Portland cement. Clay marls are found in many parts of New York, New Jersey, Michigan, Illinois, Indiana, and other northern States, and in the West. They grade into true marls. See MARL, SOILS.

CLAY PLANTS. The early stages of vegetation on clay soil resemble those on rock areas, and are treated under the head of ROCK PLANTS. The late stages are Mesophytic (q.v.). See FORESTS; GRASS LANDS.

CLAY'POLE, NOAH. A character in Dickens's *Oliver Twist.*

CLAYS, klās, PAUL JEAN (1819–1900). A Belgian marine painter. He was born at Bruges, and studied in Paris under Horace Vernet and Gudin. On his return to Belgium he exhibited in Antwerp and Brussels, but had no success until, under the influence of the French Realists, he adopted a broader style of painting. His favorite subjects were the waters of Holland and Belgium, and he showed a remarkable knowledge and comprehension of the sea in all its phases, but preferred to depict it in the sunlight. His drawing is sometimes defective, but his color is luminous and delicate, and his work is full of simplicity and charm. His pictures are to be found in most of the important modern galleries. Among the best are "Calm on the Escant" (Antwerp), "The Bay of Ostende" (Brussels), "Shipwreck on the Shetland Islands" (ib.), two Dutch marine views (National Gallery, London), "Open Sea" (Munich), and "Celebration of the Freedom of the Port of Antwerp" (Metropolitan Museum, New York).

CLAY SLATE. See SHALE.

CLAY'TON, AUGUSTINE SMITH (1783–1839). An American jurist, born at Fredericksburg, Va. He graduated at the University of Georgia in 1804, and in 1819 was elected judge of the Superior Court of the Western Circuit in Georgia. While holding that office he supported the State authorities in their occupation of territory of the Cherokee Nation, but the United States Supreme Court decided against the legality of the State's action. For differing with the Legislature on one point of the controversy, however, he was removed from office. He was elected to Congress in 1831, served two terms, took an active part in the opposition to the tariff and to the United States Bank. He was reputed to be the author of *Crockett's Life of Van Buren.*

CLAYTON, ESTELLE. An American actress and dramatic writer, whose family name was Evesson. She went on the stage in 1878 and attracted favorable notice in a number of popular plays, some of which she wrote or adapted herself. She is also the author of the texts of the operas *Paulita* (1890) and *The Viking* (1895).

CLAYTON, HENRY DELAMAR (1857–). An American political leader, born in Barbour Co., Ala. He was educated at the University of Alabama. In 1878–80 he practiced law at Clayton, Ala., and after that time at Eufaula, Ala. In 1880–84 he was register in chancery for Barbour County, and in 1890–91 was a member of the Alabama General Assembly. He was also United States district attorney in 1893–96, member of the Democratic National Committee after 1888, and permanent chairman of the Democratic National Convention at Denver in 1908. From 1897 to 1913 he was a member of Congress. In the latter year he was named United States Senator by Governor O'Neal of Alabama, but his appointment was declared illegal by the other Senators, and he finally withdrew his candidacy.

CLAYTON, JAMES BENJAMIN (1867–). An American clergyman and writer on ethnology, born at Washington, D. C. He was educated at Columbian (now George Washington) University, Southern Baptist Theological Seminary, and Potomac University. From 1887 to 1898 he was in evangelistic work. He was also pastor at Norfolk and Falls Church, Va. (1890–91); Hannibal, Mo. (1897–98); Hynesboro Park, Md. (1898–99); Anacostia, D. C. (1900–01), and First and Immanuel churches, Washington, D. C. (1909, 1910). In 1903–09 he was chief clerk of the Bureau of American Ethnology, and in 1911 he became dean of the theological department of Potomac University. His writings on folklore, symbolism, and comparative religion have appeared in periodicals.

CLAYTON, JOHN (1686–1773). An American botanist. He was born in Fulham, London, but in 1705 emigrated to Virginia, where for 51 years he was clerk of Gloucester County. Two great volumes and a *hortus siccus* of Virginia plants were left by him; but the manuscripts were destroyed by fire, together with the records of Gloucester, at the beginning of the Revolution. See CLAYTONIA.

CLAYTON, JOHN MIDDLETON (1796–1856). An American jurist and politician, born in Dagsboro, Del. He graduated at Yale in 1815, was admitted to the bar in 1818, and became a leading lawyer in his State. He was for many years (1829–37, 1845–49, and 1851–57) a leading member of the United States Senate and in 1849 became Secretary of State in the cabinet of President Taylor. In 1850 he negotiated with the British government the famous Clayton-Bulwer Treaty (q.v.). Consult the "Memoir" by J. P. Comegys, No. 4 in the *Papers of the Historical Society of Delaware* (Wilmington, 1882).

CLAYTON, POWELL (1833–1914). An American soldier and politician, born in Bethel, Pa. He followed his profession of civil engineering at Leavenworth, Kans., and at the outbreak of the Civil War became captain in the First Kansas Infantry in the Federal army. He rose to the rank of brigadier general during the struggle and at its close became a planter in Arkansas, becoming Governor of the State in 1868. He was a member of the United States Senate from 1871 to 1877 and was a member of every National Republican Convention from 1872 to 1896. In 1897–1905 he was Minister and Ambassador to Mexico.

CLAYTON-BULWER TREATY. A treaty between the United States and Great Britain, signed, after prolonged negotiations between Secretary of State John M. Clayton (q.v.), on the one side, and Sir Henry Bulwer, special Ambassador of Great Britain, on the other, on April 19, 1850, the ratifications being exchanged on July 4. Its aim was, mainly, to facilitate the construction of an interoceanic canal across the American Isthmus, and incidentally to pre-

vent the encroachment of either contracting power upon the territory of the Central American States; and its main provisions were as follows: 1. Neither power was ever to "obtain or maintain for itself any exclusive control over the said ship canal," or to "occupy, or fortify, or colonize, or assume or exercise any dominion over Nicaragua, . . . or any part of Central America." 2. The two powers formally agreed to guarantee the protection and neutrality of the canal. 3. They further agreed to invite friendly powers "to enter into stipulations with them similar to those they had entered into with each other," and also to enter into treaties with the Central American States "for the purpose of more effectually carrying out the great design of this convention." 4. Vessels of the two powers were, while traversing the canal in time of war, to be exempt from detention, blockade, or capture. 5. The protection of the two powers was extended to any other practicable communications across the Isthmus, whether by railroad or canal, the intention being "to establish a general principle," as well as to settle one particular object. At the time the ratifications were exchanged both powers issued explanatory declarations, Great Britain announcing that "her Majesty's government do not understand the engagements of that convention as applying to her Majesty's settlement at Honduras, or its dependencies"; the United States, that the treaty was not understood "to include the British settlement in Honduras, commonly called 'British Honduras,' as distinct from the State of Honduras, nor the small islands in the neighborhood of that settlement, which may be known as its dependencies." Disputes arose over the territorial claims of Great Britain in Central America, and her assumption of a protectorate over the Mosquito Indians, conflicting interpretations being placed on various provisions of the treaty by the two powers. Another treaty, the Dallas-Clarendon Treaty, designed to settle the pending disputes, was signed in October, 1856, and was ratified by the Senate soon afterward, with the addition of various amendments, which, however, the British government refused to accept. Disputes continued almost up to the time of the Civil War; but in 1860 Great Britain concluded treaties with Honduras and Nicaragua, which provided for the cession to the former of the Bay Islands, and the relinquishment of the British protectorate over the Mosquito Indians. President Buchanan thereupon announced, in his message for 1860, that "the discordant constructions of the Clayton-Bulwer Treaty between the two governments . . . have resulted in a final settlement, entirely satisfactory to this government." Nevertheless, after the close of the war, controversies again arose, and in 1881 the treaty was the subject of a compromise between Lord Granville and Secretary of State Blaine, the latter contending that any interoceanic canal across the American Isthmus should be under the political control of the United States; that the United States would view with grave concern the interference of European powers; and that the treaty should be so modified as to make it conform to conditions which had materially changed since 1850. Secretary of State Frelinghuysen, who succeeded Blaine, in December, 1881, went further, and contended that the treaty had become obsolete and was in reality no longer binding on either power; while, on the other hand, Lord Granville asserted that the treaty had never been abrogated and was still in force. Finally, by the Hay-Pauncefote Treaty, which was ratified by the United States Senate in December, 1901, the Clayton-Bulwer Treaty was formally annulled. Consult Travis, "The History of the Clayton-Bulwer Treaty" (Ann Arbor, Mich., 1900)—vol. iii of the *Publications of the Michigan Political Science Association*. The question of the various treaties with Great Britain affecting the opening of an interoceanic canal across the American Isthmus assumed an international importance in 1912, when Great Britain protested against the passing of an act by Congress admitting American ships engaged in coastwise traffic to free use of the canal. It was generally held in America that the terms of the treaties were being observed, or that circumstances were so different from those contemplated by the treaties that the treaties should be held to have lapsed. This phase of the question will be found more fully explained in the article PANAMA CANAL.

CLAYTO'NIA (after John *Clayton*, a Virginian botanist), or SPRING BEAUTY. One of the most beautiful of the early spring flowers of the United States. The plants are low, succulent herbs, growing in rich ground of bottom lands. The delicate, rose-colored flowers are striped with pink veins, and the leaves are linear or oblong. Two species, *Claytonia virginica* and *Claytonia caroliniana*, are common in the United States. *Claytonia perfoliata* is found on the Pacific coast and in Mexico and Cuba. Other species of this genus are known in Europe and Asia, one of them, *Claytonia tuberosa*, affording tubers which are eaten by the peasants of Siberia. For illustration see article GEOPHYTE.

CLAZOMENÆ, klă-zŏm'ĕ-nē (Lat., from Gk. Κλαζομεναί, *Klazomenai*). One of the twelve cities of Ionia, on the west coast of Asia Minor. It was situated at first on the south shore of the Hermæan Gulf, west of Smyrna. Later, the inhabitants seem to have moved to an island near the coast. Alexander the Great connected the island with the mainland by a dike, and the city subsequently extended over the peninsula thus formed. It was famous as the birthplace of the philosopher Anaxagoras (q.v.). The site has furnished a number of terra-cotta sarcophagi, which supply the best existing examples of Ionic ceramic painting. Consult Fowler-Wheeler, *Greek Archæology* (New York, 1909).

CLEAN'THE. In Fletcher's *Mad Lover*, the sister of Siphax of Paphos.

CLEANTHES, klē-ăn'thēz (Lat., from Gk. Κλεάνθης, *Kleanthēs*) (c.300–220 B.C.). A Stoic philosopher, born at Assos, in Troas. His poverty was such that he had to work all night at drawing water, to obtain money for his support and to pay his class fee while attending the lectures of Zeno, whom he succeeded as head of the Stoic school about 263 B.C. He died of voluntary starvation.

Of his many writings none is extant, except a "Hymn to Zeus," much admired, preserved by Stobæus (Ecl. i, 2, 12). It is an admirable union of religious feeling and philosophic thought. The fragments of Cleanthes have been collected by Wachsmuth, *Commentatio de Zenone et Cleanthe* (1874), and by Pearson (Cam-

bridge, 1891). Consult: Ritter and Preller, *Historia Philosophiæ Græcæ* (Gotha, 1888); Zeller, *Philosophie der Griechen* (Leipzig, 1869–82); Zeller, *The Stoics, Epicureans and Sceptics*, trans. by Reichel (London, 1892); Hicks, *Stoic and Epicurean* (New York, 1910); Adam, *The Religious Teachers of Greece* (Edinburgh, 1908), and for a good translation of the "Hymn to Zeus," id., *The Vitality of Platonism* (Cambridge, 1911).

CLEANTHES. 1. In Dryden's *Cleomenes*, the friend of Cleomenes. 2. In Massinger, Middleton, and Rowley's play, *The Old Law*, the son of Leonides.

CLEAR, CAPE. See CAPE CLEAR.

CLEARANCE. In the mercantile marine, a permission from the customhouse officers, or the emigration officers, or both, for the departure of a ship from a port, showing that all the formalities have been observed, and all dues, etc., paid. If a foreign vessel, she must also be certified by the consul of the nation to which she belongs. Hence the expression "cleared out" originally used in reference to the departure of a particular ship.

CLEARCHUS, klē-är'kŭs (Lat., from Gk. Κλέαρχος, *Klearchos*). A Spartan commander of the fifth century B.C., the son of Ramphias. After serving in the Hellespont he became Governor of Byzantium, 411 B.C., where he ruled with tyrannical harshness. During his absence in Asia the town was surrendered to the Athenians (409), and Clearchus was punished by a fine. He was afterward sent back to Byzantium to settle political dissensions there and to protect the Greek colonies against the Thracians; but, having set himself up as tyrant, he was condemned to death by the Ephors. He joined the younger Cyrus, for whom he levied an army of Greek mercenaries, and whom he accompanied on the famous "March of the Ten Thousand." He alone, of the Greeks, knew the real intentions of Cyrus; but it was not until they had proceeded too far to retire with safety that he disclosed them. At the battle of Cunaxa (401 B.C.) he commanded the right wing of the Greeks and was tacitly recognized as commander in chief when the retreat had begun. He was, however, treacherously seized by the Persian general, Tissaphernes, and put to death.

CLEARFIELD. A borough and the county seat of Clearfield Co., Pa., 90 miles (direct) east-northeast of Pittsburgh; on the west branch of the Susquehanna River, and on the Pennsylvania, the New York Central and Hudson River, and the Buffalo, Rochester, and Pittsburgh railroads (Map: Pennsylvania, D 4). It is situated in a region containing large deposits of coal and fire clay, and has several novelty works, lumber mills, flouring mills, planing mills, brickyards, and a steel plant, and has manufactories of sewer pipe, clay-working machinery, refrigerators, cut glass, silk velvet, knitting machines, wagons, swings, foundry products, tanned leather, etc. Clearfield was settled in 1805, and in 1840 was incorporated as a borough. Pop., 1900, 5081; 1910, 6851.

CLEARING HOUSE. Clearing-house associations are unions of banks, for the purpose of securing a speedy settlement of the claims of banks against one another. The oldest of these is the London Clearing House, which appears to have been established about 1775. The most important clearing house in the United States is that of the city of New York, which was established in 1853. Before the establishment of clearing houses the process of settling the mutual claims of banks upon one another was cumbersome and tardy. Each bank was forced to send out runners, carrying to every other bank the checks and claims that it had upon them. As each bank settled periodically its bills with every other bank, there was a continual interchange of money between them. All this has been obviated by the establishment of clearing houses, in which representatives of the several banks meet daily, for the purpose of adjusting the claims of the banks upon one another.

An insight into the workings of clearing houses can best be obtained by a brief description of the methods pursued in the New York Clearing House, which may be taken as typical of all the rest. The banks represented send daily to the clearing house at least two clerks —a delivery clerk and a settling clerk. At the clearing house each bank has a desk at which the settling clerk or clerks are seated. They bring to the clearing house in bundles the checks, drafts, and other obligations due them from other banks, each bank being represented by a separate package. They bring also a list of the amounts due them from each of the banks in question. Before clearing begins, transcriptions of these lists are handed to the inspector. The sum total represents the aggregate amount to be settled for the day. Promptly at 10 o'clock the delivery clerks begin passing from one desk to another, delivering to each the package of claims of all sorts that their banks have against other banks. These claims are accepted in bulk, without examination of the items. As soon as all of the packages have been delivered, they are carried back to the banks, where an examination of the items takes place; and if there are any that are not valid, the adjustment takes place between the bank which has received them and that which presented them, without intervention of the clearing house or rectification of the accounts drawn up there. When all of the packages have been received by the settling clerks at the clearing house, the latter draw up a statement of the demands made upon them. As these never balance the claims made by their banks, it is obvious that at the close of each day's business some of the banks will be entitled to receive money and others obliged to make payments, to settle the accounts. When each clerk has made up his account, he forwards a statement of the aggregates, with the amount of the balance to be paid or to be received. When all have forwarded their accounts to the manager, and the accounts are proved by the equality of the debit and credit aggregates and balances, the manager certifies the amounts which each bank owes to the associated banks or is entitled to receive from them.

In the London Clearing House for the settlement of balances a different rule prevails. Debit balances are settled by checks on the Bank of England in favor of the associated banks, and credit balances by similar checks drawn by the associated banks in favor of the creditor banks. In New York the amounts due by debtor banks are paid in cash to the clearing-house manager, who in turn pays the creditor banks. For this purpose gold certificates issued by the United States government are used, and also clearing-

house gold certificates, which represent gold coin deposited with the clearing house, and which are valid only in the settlement of clearing-house balances.

By the aid of the clearing house, each bank can settle all of its relations to the banks of the city by a single payment, instead of adjusting its relations with each bank separately. Furthermore, settlements are effected by the transfer of a much smaller quantity of cash than would be otherwise required. Thus, in the first year of the New York Clearing House, average daily clearings of $19,104,594.94 were effected by average daily payments of $988,078.06—but 5.17 per cent. In some years the percentage of balances paid in money has fallen as low as 3 per cent, and during the entire history of the New York Clearing House has never reached so much as 7 per cent. The aggregate New York clearings were $5,750,455,987 in 1854, and $103,754,100,091 in 1906—the year of maximum exchanges. The aggregate exchanges reflect not only the growth of the city in importance as a commercial centre, but also the business conditions throughout the country—rising in times of notable prosperity and sinking in eras of depression. Thus, we may contrast the clearings of $35,461,052,826 in 1873, $48,565,818,212 in 1881, and $37,660,686,572 in 1890, with clearings of $22,000,000,000 in 1874, $25,250,791,440 in 1885, and $24,230,145,368 in 1894. In the depression following 1906 clearings declined to $95,315,421,238 in 1907 and to $73,630,971,913 in 1908. In 1910 they had risen again to very near the level of 1906—$102,553,959,069.

The New York Clearing House is by far the most important in the United States. The excellence of the system embodied in it and the facilities which it affords to banks have been so generally appreciated that the institution has been widely copied, even in some of the smaller cities. On Jan. 1, 1914, there were in the United States not less than 120 clearing organizations which had transacted clearings in the year ending with that date in excess of $170,000,000,000. It must be said, however, that one-half of the aggregate belonged to New York City. The London Clearing House in 1912 transacted clearings to the extent of £15,961,773,000. Clearing houses exist on the continent of Europe, though the use of checks in daily life is far less frequent there than in England and in the United States, and the clearings are not so important. On the other hand, the institution is widely known in Canada, Australia, and other English colonies.

In the United States the clearing-house associations not only furnish the facilities for settlements among banks which have been described, but also enable the banks to act as units in matters of banking policy. They establish rules of banking practice in the interest of the banks, as a whole, which individual banks would not be strong enough to maintain. Thus, many associations fix the rates to be charged for the collection of out-of-town checks. Certain associations prohibit the issue of certified checks by the members. Many details of practice are thus regulated by clearing-house rules. These associations, too, foster among the banks a feeling of solidarity of interest and furnish an organ through which this can find expression. In times of financial distress it may be a matter of supreme importance to all the banks that none go to the wall; for such an occurrence may cause a run upon all the banks and a general catastrophe. The stronger banks, under such circumstances, come to the aid of their weaker brethren.

Nowhere is the function of the clearing house in sustaining the interests of the banks, and the general credit of the community, more apparent than in the issue of clearing-house loan certificates. The ordinary clearing-house gold certificate differs from a government gold certificate only in the fact that the clearing house, and not the government, is the custodian of the gold. It is preferred over the government certificate because it can be issued in denominations better suited to the needs of the banks. With these certificates the loan certificates have nothing in common. They are issued only in times of panic, to meet temporary emergencies, and are called in and canceled as soon as their work is done. In times of panic there is an unusual demand for means of payment. Under the national banking system of reserves, which permits the country banks to deposit a portion of their legal reserves in the commercial centres, this strain is felt quite severely in the money centres. It is only to a limited extent that such emergencies can be met by restricting discounts. In preparation for a demand which can be foreseen, this usually takes place; but at the moment of the crisis credits must be expanded and loans discounted freely, if the storm is to be weathered. Where free banking exists, this is usually done through increased note issues; but the banking system of the United States does not admit of such an increase. The clearing-house loan certificate relieves the situation by substituting certificates based, not on cash, but on securities for the cash ordinarily used in clearing-house operations —thereby placing this cash at the disposal of the banks for the use of their customers.

The clearing house requires a deposit of securities with a committee and issues certificates bearing a relatively high interest—in New York City, 6 per cent—up to a certain per cent of the securities deposited, generally 75 per cent. It generally provides that any loss arising from the issue of the certificates shall be assessed pro rata, either upon the capital and surplus or upon the average clearings of the banks. Thus the entire credit of the associated banks is pledged for the redemption of the certificates. The interest charge makes it to the advantage of the banks to redeem as soon as possible the certificates issued to them, and they rarely last more than a few months. This expedient was first tried by the New York Clearing House in 1860 and has been repeated in 1862, 1863, 1873, 1884, 1890, 1893, and 1907–08. In the panic of 1907–08 the first issue of certificates took place on October 26 and amounted to $11,235,000. Since this issue failed to bring relief, further issues were made, until the aggregate of issues was $101,060,000, although the maximum outstanding at any one date was $88,420,000 (Dec. 16, 1907). March 28, 1908, the certificates were finally canceled. Simultaneously with the action of the New York Clearing House, the Chicago Clearing House, for the first time in its history, resorted to a similar device. Further, the Chicago Clearing House authorized its members to surrender such certificates to the Clearing House Committee and receive in lieu thereof checks in denominations of $2, $5, and $10 (noninterest-

bearing) which might be used in general circulation. This action was widely copied by clearing houses throughout the country. It is conservatively estimated that $250,000,000 of such instruments were issued. In a few cases such issues were unsupported by adequate collateral, but all were retired without loss to the holder. In effect, the action of the clearing houses overcame the inelasticity of the American currency through the issue of a circulating medium resting upon the combined resources of the banks. The device of clearing is also employed in the stock and produce exchanges. See STOCK EXCHANGE.

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CLEARING NUT. See STRYCHNOS.

CLEAR LAKE. A body of water in Lake Co., Cal., about 90 miles north of San Francisco (Map: California, C 3). It is about 20 miles long by from 2 to 6 miles wide; there is a contraction in its southern part, which is known as "Lower Lake," and has an outlet into Cache Creek. Lakeport is on the west shore, Lower Lake at the southeastern end, and Upper Lake at the northern end.

CLEAR LAKE INDIANS. See POMO.

CLEARNESS. A quality in painting, in which light and shade (see CHIAROSCURO) are successfully achieved without a sacrifice of purity of color.

CLEAR'STO'RY, or CLERE'STO'RY. A wall pierced with windows, which rises above the roof of a lower adjacent portion of the building, intervening between it and the roof of the higher central part, which it serves to light. Thus in most churches the central aisle or nave is lighted by a clearstory from above the side-aisle roofs, but the device may occur in any type of building having a lofty central hall. The earliest known is that of the great Hypostyle Hall at Karnak (q.v.). The Romans lighted their lofty bath halls by huge semicircular windows above the roofs of the lateral chambers, and the same arrangement is seen in the basilica of Maxentius and in modern halls of the same type, e.g., the Pennsylvania Railway Station in New York. The clearstory was an essential feature of the Christian basilicas; occurs also in Hagia Sophia (q.v.) and Byzantine churches; was developed into a magnificent feature of Gothic architecture, especially in France, in connection with groin-ribbed vaulting and the flying buttress, though used also in Romanesque churches; and is frequent though of less importance in Renaissance buildings. The drum of a dome is really a form of clearstory. See ARCHITECTURE; CHRISTIAN ART; CHURCH; GOTHIC ARCHITECTURE.

CLEARWING. Any of the small moths of the family Sesiidæ or Ægeriidæ, with transparent wings, the caterpillars of which bore into the stems of trees or plants and hibernate there. Many of the clearwings are so small, brilliantly colored, and unlike moths, that they are easily mistaken for wasps or flies. The most common is the currant borer (*Sesia tipuliformis*), imported to America from Europe, and sometimes highly destructive to currant and gooseberry bushes. The peach borer (*Sanninoidea exitiosa*) is a pest in peach orchards.

CLEAVAGE (from *cleave*, AS. *clēofan*, Ger. *klieben*, to cleave, Lat. *glubere*, to peel, Gk. *γλύφειν, glyphein*, to hollow out). In geology, a property induced, under certain conditions, during deformation in a rock by virtue of which the rock may be readily split into parallel layers or rods, i.e., parallel to a plane or line. In a strict sense it is a secondary feature and therefore distinct from the property possessed by many sediments of parting along their planes of stratification. Cleavage, in rare cases, may be parallel to planes of bedding that may be present in the rock mass. The essential condition of rock cleavage is a parallel dimensional arrangement of the constituent mineral particles of the rock. In certain minerals, such as mica, parallel dimensional arrangement carries with it a parallelism of the mineral cleavage. The cleavage of a rock may be observed to occur parallel to the greater diameters of the mineral particles or to the parallel mineral cleavages. When the two coincide, as in the case of mica, the rock cleavage produced is parallel to one plane. Where they do not coincide, two rock cleavages may be produced at angles to each other, as in the case of feldspar, although one may be conspicuous and the other obscure. The property of rock cleavage is observed in rocks that have yielded to pressure by deformation without conspicuous fracture. This deformation can be induced only where the rock is under such great pressure from all sides that it flows rather than fractures. The planes or lines of rock cleavage are further observed to be normal to the directions in which the rock masses have been most shortened.

A number of processes probably coöperate to induce the parallel arrangement of mineral particles during the shortening of the rock mass. Chief among these is the recrystallization of old mineral particles and the crystallization of new particles through the agency of contained water. This process results in the elongation of the mineral particles of the rock in the plane or line of greatest elongation of the rock mass as a whole, and in shortening normal to this direction; in other words, it results in the flattening of the mineral particles through solution and deposition of mineral material. Other processes which produce rock cleavage are the rotation into parallel position of previously existing particles whose axes have unequal length, and the flattening in situ of original mineral particles through the process known as gliding, i.e., differential movement along certain definite planes and crystals without fracture. Cleavage is particularly characteristic of the finer-grained rocks like slates and shales. The coarsely textured rocks under pressure metamorphism develop a parallel arrangement, but do not split so readily or smoothly; such structure is known as foliation, or schistosity.

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(Basel, 1878); Tyndall, "Comparative View of the Cleavage of Crystals and Slate-Rocks," in *Philosophical Magazine*, 4th series, vol. xii (London, 1856); Daubrée, *Géologie expérimentale*, vol. i (Paris, 1879); Van Hise, "Principles of North American Pre-Cambrian Geology," in *Sixteenth Annual Report of the United States Geological Survey* (Washington, 1896); Becker, "Current Theories of Slaty Cleavage," in *American Journal of Science*, 4th series, vol. xxiv (New Haven, 1907).

CLEAVAGE OF CRYSTALS. Most crystals, owing to the regular arrangement of the molecules, possess directions along which cohesion is at a minimum. They therefore tend to fracture along planes normal to these directions, which are called "planes of cleavage." The tendency of a crystal to cleave is necessarily the same for any plane as for any other parallel plane; in other words, cleavage planes have direction rather than position. Cleavage planes, in their relative perfection and number, conform to the symmetry of the crystal in which they occur and are usually parallel to the faces of some crystal form of fundamental or very simple crystallographic relation. Tendency to cleave along special planes determined in position as well as in direction is described as "parting." See CRYSTALLOGRAPHY; MINERALOGY.

CLEAVE'LAND, MOSES (1754–1806). An American pioneer, the founder of Cleveland, Ohio. He was born in Canterbury, Conn.; practiced law, served in the Revolutionary War, and became brigadier general of militia in 1796. In 1795 he joined a number of others in purchasing from Connecticut, for $1,200,000, the tract in Ohio known as the "Connecticut Western Reserve." He directed the surveyors who laid out the site of the present Cleveland, which was named after him. The form of the name was altered, in 1831, to Cleveland by the editor of the *Cleveland Advertiser*, who wished to economize space for a headline.

CLEAVELAND, PARKER (1780–1858). An American geologist and mineralogist, identified with the early progress of the natural sciences. He was born in Rowley, Mass., graduated at Harvard in 1799, was tutor in mathematics there from 1803 to 1805, was chosen professor of mathematics and natural philosophy and lecturer on chemistry and mineralogy in Bowdoin College—a position which he retained until his death, although many professorships in other colleges and the presidency of his own were offered to him. He gathered a valuable collection of minerals and published a treatise on *Mineralogy and Geology* (1816; 3d ed., 1856), which earned for him the title of "Father of American Mineralogy."

CLEAVERS. See GOOSE GRASS.

CLEBSCH, klāpsh, RUDOLF FRIEDRICH ALFRED (1833–72). A German mathematician, born at Königsberg, Prussia. He studied at Königsberg, where he was a pupil of Hesse, Richelot, and F. Neumann. He held the chair of theoretical mechanics at the polytechnic school in Karlsruhe from 1858 to 1863; was made professor of mathematics at Giessen in 1863 and at Göttingen in 1868. His attention was drawn to algebra and geometry by the study of Salmon's works. In 1868 he founded, with Neumann, the *Mathematische Annalen*. His vast contributions to the theory of invariants; his use of the notion of the deficiency of a curve; his applications of the theory of elliptic and Abelian functions to geometry and to the study of rational and elliptic curves, have secured for him a preeminent place among those who have advanced the science of geometry. His works upon the general theory of algebraic curves and surfaces began with the determination of those points upon an algebraic surface at which a straight line has four-point contact. Clebsch undertook to render the notion of "deficiency" fruitful for geometry—a notion found first in Riemann's *Theorie der Abelschen Functionen* (1857). By "deficiency" of a curve is meant the difference between the number of its double points and the maximum number possible in such a curve. (See CURVE.) Clebsch and Cremona studied the representation of cubic surfaces on a plane through a one-to-one correspondence—a notion that has led to the study of higher correspondences between surfaces by Cayley (q.v.) and Nöther. Clebsch solved, by aid of the addition theorem of elliptic functions (see FUNCTION), the generalized form of Malfatti's Problem. He also solved (1862) the so-called "Pfaffian Problem" of differential equations, by making it depend upon a system of simultaneous linear, partial differential equations whose statement is possible without integration. Clebsch took a leading part in showing the great significance of the theory of invariants for the theory of hyperelliptic and Abelian functions; and to him is due the transformation of the theory of binary to that of ternary forms. (See FORMS.) He died at Göttingen, Nov. 7, 1872. Vol. vii of the *Mathematische Annalen* contains an excellent article on Clebsch, in which the value of his works is estimated by Brill, Gordan, Klein, Mayer, Nöther, and other contemporaries. His *Vorlesungen uber Geometrie* were edited by Lindemann (Leipzig, vol. i, 1875–76; vol. ii, 1891; new ed., 1906).

CLE'BURNE. A city and the county seat of Johnson Co., Tex., 54 miles southwest of Dallas, on the Gulf, Colorado, and Santa Fe, the Trinity and Brazos Valley, and the Missouri, Kansas, and Texas railroads (Map: Texas, D 3). It carries on a large trade in grain, live stock, cotton, wool, hides, and produce, and has cotton compresses, cottonseed-oil mills, flour mills, foundry and machine shop, and shops of the Gulf, Colorado, and Santa Fe Railroad and of the Trinity and Brazos Valley Railroad. The courthouse, Carnegie library, and high school are the notable features. There are municipal water works. Pop., 1890, 3278; 1900, 7493; 1910, 10,364.

CLEBURNE, PATRICK RONAYNE (1828–64). An American soldier. He was born in County Cork, Ireland; studied medicine for a time at Trinity College, Dublin; ran away from home and served for several years in the British army. In 1855 he emigrated to the United States and settled in Helena, Ark., where he studied law, was admitted to the bar, and practiced with considerable success. On the outbreak of the Civil War he enlisted in the Confederate army as a private, but by March, 1862, rose to the rank of brigadier general. He commanded a brigade at the battle of Shiloh; was wounded in the battle of Perryville, Ky., on Oct. 8, 1862; was promoted to be major general in December of that year; was distinguished for gallantry at Murfreesboro, and at Chickamauga led a brilliant charge and earned the title "The Stonewall of the West." In the battle of Missionary Ridge he commanded the right wing of the

Confederate army; subsequently took an important part, as division commander under Johnston, against Sherman, and as a corps commander under Hood, in the Atlanta campaign against Sherman, and later in the Tennessee campaign against Thomas and Schofield; and at the battle of Franklin, on Nov. 30, 1864, he was killed while leading a charge on the Federal works. He was an organizer of the "Order of the Southern Cross" and was one of the first men in the Confederacy to advocate the use of colored troops. Consult the biographical sketch, by General Gordon, in *Southern Historical Society Papers*, vol. xviii (Richmond, 1889).

CLECKHEATON, klĕk'ê-tŭn. A town in the West Riding of Yorkshire, England, 5½ miles southwest of Bradford (Map: England, E 3). It has manufactures of woolens, worsteds, blankets, chemicals, wire cord, and machinery. Pop., 1901, 12,524; 1911, 12,866.

CLEDON'ISMAN'CY. See SUPERSTITION.

CLE ELUM. A city in Kittitas Co., Wash., 100 miles southeast of Seattle, on the Northern Pacific and the Chicago, Milwaukee, and St. Paul railroads, and on the Yakima River (Map: Washington, E 3). It is in a coal-mining and agricultural region, and has dairying, fruit-growing, and lumbering interests. There are municipal water works and a hospital. Cle Elum was founded in 1887 and was incorporated as a city in 1905. Pop., 1910, 2749.

CLEETHORPES, klē'thôrps. A town and watering place in Lincolnshire, England, 3 miles east-southeast of Great Grimsby (Map: England, F 3). It owns a new market and recreation pier. There is an electric-lighting plant. Pop., 1901, 12,578; 1911, 21,417.

CLEF. See MUSICAL NOTATION, *The Clefs.*

CLEFT PALATE. See PALATE.

CLEISHBOTHAM, klēsh'bŏTH-*am*, JEDEDIAH. The imaginary "collector" in Scott's series of novels, *Tales of my Landlord.*

CLEISTHENES, klīs'thê-nēz. See CLISTHENES.

CLEISTOG'AMOUS FLOWERS (Gk. κλειστός, *kleistos*, that which may be closed, from κλειειν, *kleiein*, to close + γάμος, *gamos*, marriage). Relatively inconspicuous and never-open flowers, which occur, along with the ordinary flowers, in many plants, representing all of the principal groups of the flowering plants. Cleistogamous flowers are seldom in a conspicuous position. One of the best-known illustrations is in the stemless species of violets. In these, in addition to the well-known conspicuous flowers, cleistogamous flowers occur more or less concealed near the base of the cluster of leaves and flower stalks. Since these flowers are never open, they are necessarily self-pollinated; but they are very fertile and produce an abundance of seed. The significance of this dimorphism in the flowers of so many plants is not clear. It has been suggested that, in case cross-pollination is not secured by the showy flowers, the presence of self-pollinating cleistogamous flowers makes seed production secure. However, some plants with cleistogamous flowers, as grasses and rushes, are anemophilous (wind-pollinated), so that it is not a habit entirely related to the uncertainties of pollination by insects. In comparing the development of the cleistogamous and ordinary flowers it is discovered that the former are like the latter at various stages of development.

The following quotation from Darwin's *Different Forms of Flowers* presents some detailed differences: "In cleistogamous flowers the petals are rudimentary or quite aborted; their stamens are often reduced in number, with anthers of very small size, containing few pollen grains, which have remarkably thin, transparent coats, and generally emit their tubes while still inclosed within the anther cells; and, lastly, the



CLEISTOGAMY.

A plant of *Polygala polygama*, showing ordinary flowers of erect aërial stems, and numerous cleistogamous flowers on underground stems.

pistil is much reduced in size, with the stigma in some cases hardly at all developed. These flowers do not secrete nectar or emit any odor; from their small size, as well as from the corolla being rudimentary, they are singularly inconspicuous. Consequently, insects do not visit them; nor, if they did, could they find an entrance. Such flowers are, therefore, invariably self-fertilized; yet they produce an abundance of seed. In several cases the young capsules bury themselves beneath the ground, and the seeds are there matured. These flowers are developed before, or after, or simultaneously with the perfect ones." See authorities cited under BOTANY.

CLEISTOG'AMY. See POLLINATION.

CLEIVELAND, JOHN. See CLEVELAND, J.

CLE'LAND, WILLIAM (c.1661–89). A Scottish Covenanting poet. He is supposed to have been born in Lanarkshire, Scotland. After leaving St. Andrews University he joined the Covenanters and at Bothwell Bridge acted as captain. He twice escaped to Holland, returning to Scotland in 1685 and 1688, the last time as agent of William of Orange, and was made lieutenant colonel of the Cameronian Regiment, under Lord Angus Cameron, which was sent to put down the uprising that followed the fall of Claverhouse at Killiecrankie. The Cameronians held out after a whole day's fighting at Dunkeld (Aug. 21, 1689) against heavy odds; but in the action Cleland was killed. He wrote *Several Poems and Verses*, which appeared posthumously in 1697, but he is better known through his connection with the Cameronian Regiment.

CLÉLIE, klā'lē'. The heroine of a romance

of the same name, by Mademoiselle de Scudéry, originally issued under her brother's name (1656).

CLÉMANGES, klā'mänzh', NICOLAS DE (c.1360–c.1434). A French theologian—one of the ablest Roman Catholic theologians of the Middle Ages. He was educated in Paris, where he studied theology under Pierre d'Ailly. He was rector of the university from 1393 to 1395 and was esteemed, with his teacher and Gerson, the glory of the institution. He was an ardent advocate of reform in the church, wrote strongly against the immoral lives of many of the higher clergy, and labored with great pertinacity to heal the schism then existing—especially by preventing the election of another Antipope in place of the so-called Clement VII. But when Pedro de Luna (q.v.) was elected by the Avignon cardinals in 1394, taking the name of Benedict XIII, Clémanges became his secretary, thinking that in this position he could render a service to the divided church. When, in 1407, a breach came between Benedict and the French court, Clémanges, unjustly suspected of being the author of the bull of excommunication launched by Benedict against the King, left Avignon, and went first to his canonry at Langres, and then into the retirement of the Carthusian monasteries at Valprofonds and Fontaine-du-Bosc. Here he pursued his studies and produced several important works upon the study of the Bible and upon the corruptions then existing in the church. In 1415 he exercised a great influence on the Council of Constance and made a strong plea for church unity and purity, and in 1421 defended the liberties of the Gallician church at the Council of Chartres. In 1425 he returned to Paris and lectured on rhetoric and theology in the College of Navarre and there died, probably in 1434. His collected works, with a life by J. M. Lydius, appeared at Leyden in 1613. The often-quoted *De Ruina Ecclesiæ seu de Corrupto Ecclesiæ Statu*, while frequently attributed to Clémanges, is demonstrably not his. Consult Müntz, *Nicolas de Clémanges, sa vie et ses écrits* (Strassburg, 1846), and Creighton, *A History of the Papacy* (London, 1882).

CLEM'ATIS (Gk. κλημαρίς, *klēmaris*, brushwood, from κλῆμα, *klēma*, vine shoot, from κλᾶν, *klan*, to break). A genus of plants of the family Ranunculaceæ, having 4–6 colored sepals, petals small or none, and numerous one-seeded achenes, with long, generally feathery, awns. The species, which number about 150, are herbs or shrubs, generally with climbing stems, mostly natives of temperate climates, and much scattered over the world. They possess more or less active properties. The long awns of some species give the plants a beautiful appearance even in winter. The flowers of many species are also beautiful. *Clematis vitalba*, the common traveler's joy, is the only native of Great Britain, where it is common in the south, but becomes rarer towards the north and is scarcely found in Scotland. The stems are capable of being made into baskets. It rapidly covers walls or unsightly objects. The fruit and leaves are acrid and vesicant; the leaves are used as a rubefacient in rheumatism, and those of other species are also employed in the same way. About 20 species are indigenous to North America, and of these *Clematis virginiana*, or virgin's bower, is very widely distributed, making a very showy appearance with its graceful sprays of white flowers. Its fertile flowers are succeeded by fruit with conspicuous feathery tails. *Clematis verticillaris*, with peduncles bearing large, single, bluish-purple, and drooping flowers, is a rare species, found in rocky woods, from Maine to western New England and thence to Virginia, Wisconsin, and northwestward. *Clematis viorna*, popularly called "leather flower," grows in rich soils in the Middle and Southern States. *Clematis pitcheri*, a species found along the Mississippi from Illinois southward, has a bell-shaped calyx, dull, purplish sepals, and noticeably reticulated leaves. *Clematis paniculata*, a native of Japan, is one of the most popular climbers for porches, etc. It resembles the virgin's bower, but its flowers are quite fragrant. Among the many species seen in our gardens are *Clematis viticella*, with its solitary, bell-shaped blossoms, and *Clematis florida* and *Clematis patens*, with large blue and purple flowers, natives of Japan. One of the most pleasing, an evergreen, with large white flowers, is *Clematis indivisa*, a native of New Zealand. Some species, as *Clematis flammula*, are found in southern Europe and in the mountainous parts of northern Africa. The colors of the blossoms in this genus vary from pure white to yellow, deep purple, and ruby or scarlet. A serious disease affecting clematis is due to attacks of nematode worms on the roots. Fresh soil, or soil in which the worms are killed by heat or cold, is about the only remedy. See authorities cited under BOTANY.

CLEMENCEAU, klā'mäN'sō', GEORGES BENJAMIN EUGENE (1841–). A French politician and journalist, born at Mouillerou-en-Pareds in Vendée. He was educated to be a physician, but soon drifted into politics and was elected maire of the district of Montmartre in Paris. In 1876 he was chosen as Republican member for the Chamber of Deputies and became a bitter opponent of the Royalist Broglie ministry. From the very outset of his parliamentary career he attracted public attention by his pithy utterances and independent action. His political influence was made greater by his journalistic activities; for in 1880 he founded the daily paper, *La Justice*, of which he became chief editor. When General Boulanger appeared on the political horizon, Clemenceau espoused his cause; but when he discovered that the general was plotting to destroy the Republic, he promptly deserted him. In 1893 Clemenceau lost his seat in the Chamber because of suspicions that he was concerned in the Panama scandal; later, in 1902, he was elected Senator from the Department of the Var, an office which he still held in 1914. During the Dreyfus affair he was a strong believer in the innocence of the accused captain and founded a new daily, *L'Aurore*, to champion his cause. It was in this paper that Zola published the famous letter, *J'accuse*. In 1906 Clemenceau became Minister of the Interior in the Sarrien cabinet, and shortly succeeded to the premiership, which he held till 1909, when he was defeated as a result of a debate on the condition of the navy. This did not end Clemenceau's political activities; he continued in power if not in office and was instrumental in overthrowing the Briand ministry (July 12, 1913) on the issue of proportional representation. He became the editor of a paper called *L'Homme Libre*, which is widely read in Paris.

M. Clemenceau has been, and still is, the stormy petrel of French politics. He is a type

of journalist politician that is quite common in France, brilliant, irresponsible, and influential in attack. Many cabinets have been overthrown by him, and he is popularly known as the Destroyer of Ministries. In politics he has been a consistent Radical and faithful to the tradition of Gambetta. As Prime Minister, he proved himself to be a bitter enemy of the church and carried out the law separating church and state with great firmness. The most important event that happened while he was in office was the great miners' strike organized by the Socialists. Clemenceau personally went down to the mining districts to investigate the complaints of the workmen, who, knowing his revolutionary temperament, expected his sympathy. "We are not fighting on the same side of the barricades now," was the reply of Clemenceau. When the miners became riotous, they were sternly put down by the military, and the strike was lost. For this the ministry was bitterly attacked by the Socialists, and a great debate took place between Jean Jaures, the Socialist leader, and Clemenceau, which attracted wide attention because the fundamental principles of Socialism were attacked and defended with unusual brilliancy. To the charge of Jaures that the ministry had used the government to crush the working class, Clemenceau replied that he had crushed no class, but only individuals who were rioting. He then asked Jaures whether he would have acted differently had he been in office. To this Jaures made no answer. "You do not reply!" exclaimed Clemenceau triumphantly, "and in failing to reply, you do reply." Although strongly opposed to Socialism, Clemenceau is no individualist, but a believer in radical social legislation and government ownership of monopolies. In 1907 there occurred the uprising of the wine growers in the south of France against the wine merchants who were adulterating their wares. This came near being a revolution; it was avoided mainly through the prompt action of Premier Clemenceau, who sternly put down all attempts at rioting.

M. Clemenceau is a brilliant speaker and writer. His style is clear, incisive, and forcible. No man in France has a sharper tongue or readier pen. He is very witty, and ministries fear his epigrams as much as his arguments. Like many other French public men, his intellectual interests are not limited to politics only; he is very versatile and has written plays, novels, philosophic essays, and sociological studies.

CLEMENS, klĕm'enz, JEREMIAH (1814–65). An American lawyer and politician. He was born at Huntsville, Ala., and graduated at the University of Alabama in 1833. He was admitted to the bar in 1834, served for several terms in the State Legislature, and distinguished himself in the Mexican War. He was United States Senator from 1849 to 1853, was presidential elector in 1856, and during the Civil War accepted office under the Confederacy, though he never favored secession. In 1864 he became a Unionist and advocated the reëlection of Lincoln. He was the author of several novels, including: *Bernard Lyle* (1853); *Mustang Gray* (1857); *The Rivals: A Tale of the Times of Aaron Burr and Alexander Hamilton* (1859; 1900); *Tobias Wilson: A Tale of the Great Rebellion* (1865).

CLEMENS, SAMUEL LANGHORNE (1835–1910). An American novelist and humorist, better known as "Mark Twain"—a name derived from calls used in taking soundings on the Mississippi, and first employed by Mr. Clemens in newspaper work in 1863. It had previously been taken as a pen name by Capt. Isaiah Sellers in the New Orleans *Picayune*. Mr. Clemens was born at Florida, Mo., Nov. 30, 1835. He received the common-school education of a frontier town and, becoming an expert compositor, worked at this trade in St. Louis, New York, and other cities. In 1851 he gave up printing and became a steamboat pilot on the Mississippi, accumulating a fund of experience that he was later to turn to unique literary account in his *Life on the Mississippi* and other books. The Civil War closed this livelihood to him. He joined a volunteer squad of Confederate sympathizers, remaining with the command for a few weeks, but seeing no active service. Then he went to Nevada with his brother, who had received a political appointment there, and at Virginia City became a reporter and staff writer for the *Territorial Enterprise*, revealing here first to the public his powers of humorously exaggerated description and sarcastic wit. From Nevada he followed the trend to San Francisco, tried mining in Calaveras County, made a voyage to the Sandwich Islands, and attracted attention as a humorous lecturer and writer of localized fiction. The success of his lectures and a book called by the name of the first story, *The Jumping Frog of Calaveras County* (1867), led to his participating, with journalistic intent, in an excursion to the Orient. His letters about his trip, in revised form, became the well-known *Innocents Abroad* (1869), which won him fame on both continents. Then for two years (1869–71) Clemens edited the Buffalo *Express*. In the last-named year he married Miss Olivia L. Langdon, and established himself in Hartford, Conn. In 1872 he gathered reminiscences of Far-Western life in *Roughing It*, and became a frequent contributor to magazines and journals, chiefly in a vein of exaggerated humor. His next book was *The Gilded Age* (1873), written in collaboration with Charles Dudley Warner, and afterward successfully dramatized. Then came *The Adventures of Tom Sawyer* (1876). A second trip to Europe furnished material for *A Tramp Abroad* (1880); then followed *The Stolen White Elephant* (1882); *The Prince and the Pauper* (1882), an historical romance; *Life on the Mississippi* (1883); and *Huckleberry Finn* (1885). In 1884 he engaged in the publishing enterprise of Charles L. Webster and Company, the failure of which, about a decade later, led him to make a lecture tour around the world (1895–96), by means of which he reëstablished his fortune and more than cleared his commercial honor. For 10 years after 1889 Mr. Clemens lived chiefly in Europe. During this period he published: *A Connecticut Yankee at King Arthur's Court* (1889); *The American Claimant* (1892); *Merry Tales* (1892); *The £1,000,000 Bank Note* (1893); *The Tragedy of Pudd'nhead Wilson* (1894); *Tom Sawyer Abroad* (1894); *Personal Recollections of Joan of Arc* (1896); *Following the Equator* (1897), known in England as *More Tramps Abroad; The Man that Corrupted Hadleyburg* (1900), a collection of sketches; and after his return to America, *A Double-Barreled Detective Story* (1902), *Christian Science* (1903), *A Dog's Tale* (1904), *Eve's Diary* (1906), and *The $30,000 Bequest* (1906). In 1907 he made a sojourn in England, which was a long ovation to him. Everywhere

he was received with the warmest regard and esteem, and Oxford honored him with the degree of Litt.D. Although best known, and rightly so, as a humorist, Mr. Clemens had a thoroughly serious side to his character, as shown in later years by his public discussion in articles or speeches of various questions that aroused his sympathy or indignation. But his best, and perhaps his most permanent work, was done as a picaresque novelist in the *Adventures of Tom Sawyer* and the *Adventures of Huckleberry Finn*, stories which preserve, as only works of genius can, frontier types that now have vanished forever or survive only in remote corners of the land, and which are peopled with characters, old and young, that well deserve literary immortality. No other writer has so vividly portrayed the irresponsible American boy, or given his readers so adequate an impression of the large, homely, spontaneous life led by native Americans in the great valley of the Mississippi, as has Samuel Clemens.

His humor, like Lincoln's, characteristically American, has its coarser side, to be sure. "Mark Twain's" fun often sins against good taste and is irreverent and flippant at wrong times and places. But his comic force and fertility offset all defects; and beneath what seems reckless levity there is sound morality as well as clear-eyed shrewdness and hard common sense. The predilection which he vaunts in much of his work for exploiting the mean aspect of things venerable or impressive betrays a touch of the spirit of American philistinism. Of this the *Innocents Abroad* is an instance. But not so *Huckleberry Finn* and *Tom Sawyer;* in those, his best books, he appears as a master of humor and pathetic suggestion, and a truly creative genius.

An edition of Mark Twain's collected writings, *Writings of Mark Twain*, was published in 25 vols. (New York, 1910). *Mark Twain's Speeches*, ed. by W. D. Howells, also was first published in New York in the year of the author's death. For biography, consult A. B. Paine, *Mark Twain: A Biography* (New York, 1912); for bibliography, see M. Johnson, *Bibliography of Mark Twain* (ib., 1910). Among the many books concerned with this author may be mentioned: A. Henderson, *Mark Twain* (New York, 1911); H. Sedgwick, "Mark Twain," in *The New American Type* (Boston, 1908); W. D. Howells, *My Mark Twain* (New York, 1910); J. Macy, "Mark Twain," in *The Spirit of American Literature* (ib., 1913).

CLEMENS, klē'mĕnz, TITUS FLAVIUS. See CLEMENT OF ALEXANDRIA.

CLEM'ENT (Lat. *clemens*, merciful, Gk. κλήμης, *klēmēs*). The name of 14 popes.—CLEMENT I, commonly known, in historical theology, as "Clement of Rome" and listed among the "Apostolic Fathers," is probably not identical with the Clement mentioned in Phil. iv. 3. After the Apostles, however, no one stood in higher honor among the early Christians; in fact, he is sometimes, as by Clement of Alexandria, called an "apostle." In the lists of bishops which began to be produced in the latter half of the second century Clement stands third from Peter in the Roman succession—the best order being Linus, Anacletus, Clement. The provisional dates assigned to him by the best modern historians are 88–97 A.D.; but there is much uncertainty about them. According to Jerome, Clement lived until the third year of Trajan (101 A.D.). His Epistle may be dated with high probability in the year 95 or 96. It was written in the name of the church in Rome to that in Corinth and contains fraternal advice and counsel in view of disturbances which had arisen in the latter church. It is an important source for the history of primitive Christianity. It was for a long time honored as "Scripture" and read in public worship as late as the fourth century. The other documents which bear Clement's name are not from him. What is known as II Clement appears to be a second-century homily, of unknown origin. Several spurious epistles are attributed to him, besides the pseudo-Clementine "Recognitions and Homilies," on which see CLEMENTINA. Consult: J. B. Lightfoot, *The Apostolic Fathers*, part i; *St. Clement of Rome* (London, 1890); Knopf, *Der erste Clemensbrief* (Leipzig, 1899); Gregg, *The Epistle of St. Clement, Bishop of Rome* (London, 1899); Krüger, *History of Early Christian Literature* (New York, 1897); Harnack, *Chronologie der altchristlichen Litteratur* (Leipzig, 1897); Wrede, *Untersuchungen zum ersten Clemensbrief* (Göttingen, 1891).—CLEMENT II, Pope 1046–47. He was a Saxon, Suidger by name, and Bishop of Bamberg. The Emperor Henry III, whose chancellor he had been, made him Pope on the setting aside of the three rival claimants, Benedict IX, Gregory VI, and Sylvester III; and he crowned Henry the next day. He was a determined opponent of simony, against which he held a synod a few months before his death.—CLEMENT III, Pope 1187–91. He was a Roman by birth, and Cardinal Bishop of Palestrina. He settled some of the troubles between the popes and the Roman people, incited Philip Augustus and Henry II of England to undertake the Third Crusade, and in 1188 made the Scottish church directly dependent upon Rome, removing it from the jurisdiction of the archbishops of York. The title of CLEMENT III was also assumed by Wibert (Guibert), Antipope from 1080 to 1099 (died 1100).—CLEMENT IV, Pope 1265–68. Gui Foulquois le Gros, born at Saint-Gilles, on the Rhône, of a noble Provençal family, at first a soldier, later Archbishop of Narbonne and Cardinal Bishop of Sabina. He supported Charles of Anjou in his claim to the crown of the Two Sicilies, against Manfred, the natural son of the Emperor Frederick II. He was a man of austere piety and set his face steadfastly against nepotism. He encouraged and protected Roger Bacon.—CLEMENT V, Pope 1305–14. Bertrand d'Agoust, or de Goth, Archbishop of Bordeaux. He was strongly under the influence of Philip the Fair, at whose bidding he suppressed the Order of Templars (see TEMPLARS, KNIGHTS), and was the first of the popes to reside at Avignon, which continued to be the seat of the papacy for nearly 70 years. Consult: Rabanis, *Clément V et Philippe le Bel* (Paris, 1858); Lacoste, *Nouvelles études sur Clément V* (Bordeaux, 1896).—CLEMENT VI, Pope 1342–52. Pierre Roger, Archbishop of Rouen, and, like his three predecessors, a Frenchman. He, too, was entirely under French influence and refused to return from Avignon to Rome, in spite of a formal invitation delivered by a delegation headed by Petrarch. He excommunicated the Emperor Louis of Bavaria and compelled him to submit to the most humiliating conditions. As suzerain of the Kingdom of Naples, he acquitted Queen Joanna of the murder of her hus-

band and purchased the territory of Avignon from her for 80,000 crowns. He maintained the ecclesiastical jurisdiction against the encroachments of Edward III of England and made some negotiations for a reunion with the Eastern church. He lived in great splendor and contributed largely to the beautifying of the Avignon residence.—CLEMENT VII, Pope 1523–34. Giulio de' Medici, born about 1475. Before his elevation he had acquired some reputation for capacity in affairs which the unfortunate events of his pontificate showed to have been ill-founded. His worldliness and lack of insight into the tendencies of the age disqualified him from comprehending the great upheaval which threatened the Church, while his timidity and indecision no less disabled him from following a consistent policy in secular affairs. He was at first attached to the Imperial interest, but by the overwhelming success of the Emperor Charles V in the battle of Pavia was terrified into joining the other Italian powers in a league with France. But his zeal was soon cooled, and by want of foresight and unreasonable economy he laid himself open to an attack from the turbulent Roman nobles, which obliged him to invoke the mediation of the Emperor. When this danger seemed past, he veered back to his former engagements, and ended by drawing upon himself the army of the Constable de Bourbon. On May 6, 1527, followed the memorable and terrible sack of Rome by the Imperial troops. The Pope retired to the castle of Sant' Angelo, where he was kept a prisoner for over six months. He was released upon very onerous conditions and fled immediately to Orvieto. The following year he returned to Rome, and in 1529 he made his peace with Charles V, who undertook to assist in the restoration of the Medici in Florence, and whom the Pope crowned at Bologna in 1530. For several years Clement followed a policy of subserviency to the Emperor, on the one hand endeavoring to induce him to act with severity against the Lutherans of Germany, and on the other striving to elude his demand for a general council. The loss of half of Germany to the Church and the breach with England, occasioned by the Pope's refusal to sanction the divorce of Henry VIII, made this a most unfortunate pontificate. Consult: Creighton, *History of the Papacy during the Reformation* (London, 1882); Vaughan, *The Medici Popes* (ib., 1908). The title of CLEMENT VII was also assumed by Robert of Geneva, Antipope (see ANTIPOPE), 1378–94.—CLEMENT VIII, Pope 1592–1605. Ippolito Aldobrandini, born about 1536. He brought about the reconciliation of Henry IV of France with the Church (1593), and, on the extinction of the male line of the house of Este, annexed Ferrara, the last addition of importance to the States of the Church. He acted as mediator in the negotiations which resulted in the Peace of Vervins. The last years of his pontificate were occupied, among other important questions, by the controversy between the Jesuits and Dominicans on the question of grace, which led him to establish in 1597 the celebrated *Congregatio de Auxiliis Divinæ Gratiæ*. He was a man of marked piety; he confessed daily to Philip Neri, and after the latter's death to his successor in the headship of the Oratorians, Cardinal Baronius. His love for letters was shown by his promotion of a number of learned scholars to the purple, and the issue of revised editions of the Vulgate, the breviary, and the liturgical books. The title CLEMENT VIII was also assumed by Ægidius Muñoz, Antipope, 1425–29.—CLEMENT IX, Pope 1667–69. Giulio Rospigliosi. He was born in 1600 and studied in the Roman Seminary. As nuncio to Spain, he acquired an insight into political affairs and an influence which enabled him, after his elevation to the papal throne, to bring about the Peace of Aix-la-Chapelle (1668) between France and Spain. He endeavored to adjust the Jansenist (q.v.) difficulties in France, but his efforts failed to bring about a permanent peace. —CLEMENT X, Pope 1670–76. Emilio Altieri, born 1590. He was the immediate successor of Clement IX, who had made him Cardinal but a few months before his death, and with his last breath designated him as his choice for the papal throne. In consequence of his advanced age he left much of the government to his nephew, Cardinal Paluzzo Paluzzi.—CLEMENT XI, Pope 1700–21. Giovanni Francesco Albani, born 1649. He was employed in many important diplomatic affairs and made Cardinal a few months before his election to the papacy. His pontificate was troubled by many disputes, with Prussia, with the Empire, and with the recalcitrant Jansenists in France, against whom he launched the famous constitutions *Vineam Domini Sabaoth* (1705) and *Unigenitus* (1713). Another important decision by this Pope forbade the Jesuit missionaries in China to employ certain pagan customs which they had adopted to overcome native prejudices.—CLEMENT XII, Pope 1730–40. Lorenzo Corsini, born 1652, made Cardinal 1706. He was distinguished as a wise and kind-hearted temporal sovereign, who did much for both art and industry in his dominions, and who labored for union with the Greek church. In 1738 he condemned the Freemasons. —CLEMENT XIII, Pope 1758–69. Carlo Rezzonico, born 1693; made Cardinal 1737, on the recommendation of Venice, his native state. His reign was occupied with unceasing struggles for the rights of the Church and for the preservation of their ardent champions, the Jesuits, against the liberalizing governments of his day, such as those controlled by Pombal in Portugal and Choiseul and Madame de Pompadour in France. He witnessed, however, the expulsion of the Jesuits from Portugal, France, and Spain. It was believed that he was about to yield to the demand for the suppression of the order, when he died, leaving these thorny questions to his successor, Clement XIV.—CLEMENT XIV, Pope 1769–74. Giovanni Vincenzio Antonio Ganganelli, born 1705 at Sant' Arcangelo, near Rimini, where his father was a physician. At the age of 18 he entered the Order of Minorites and studied philosophy and theology, which he afterward successfully taught. His merits were appreciated by the keen-sighted Benedict XIV, who appointed him to the important post of counselor to the Inquisition, and under Clement XIII he was made Cardinal. No Pope had ever confronted greater difficulties on his accession. The kings of Portugal, France, Spain, and Naples were at variance with him, chiefly on account of his support of the Jesuits; Venice wished to reform the religious orders without his interference; Poland was seeking to diminish his influence; the Romans themselves were discontented. He first set about reconciling the monarchs; he sent a nuncio to Lisbon, suspended the bull *In Cena Domini*, and entered into negotiations with Spain and France. After several

years of negotiation he signed, much against his will, on July 21, 1773, the famous brief *Dominus ac Redemptor noster*, suppressing the Society of the Jesuits. The motive assigned in the brief is, "regard to the peace of the Church." Soon after, his health gave way, it was rumored on account of his disquietude of conscience. He died of a scorbutic disease, Sept. 22, 1774. Clement XIV was remarkable for liberality of mind, address as a statesman, sound learning, and mildness of character. He cherished the arts and sciences and was the founder of the Clementine Museum, which, by the additions of Pius VI and Pius VII, became the chief ornament of the Vatican. Consult: A. Theiner, *Geschichte des Pontificats Clement XIV* (Paris, 1853); Von Reumont, *Ganganelli (Papst Clement XIV), seine Briefe und seine Zeit* (Berlin, 1847); Ravignan, *Clément XIII et Clément XIV* (Paris, 1854).

CLÉMENT, klā'mäN', (FRÉDÉRIC JEAN) EDMOND (1867–). A French dramatic tenor, born in Paris. He was educated at the Institution Nôtre-Dame de Chartres and at the Conservatory in Paris. He made his début at the Opéra Comique in *Mireille*. Later he appeared in *Mignon, La fille du régiment, Fra Diavolo, Lakmé, Don Juan, L'Eclair, Haydée, Don Pasquale, Proserpine*. He also created important rôles in *Benvenuto, Phryné, Falstaff, Xavière, L'Amour à la Bastille, L'Ile du rêve, Beaucoup de bruit pour rien, Le Juif polonais*, and *La petite maison*.

CLEM'ENT, ERNEST WILSON (1860–). An American educator and writer on Japan. He was born in Dubuque, Iowa; graduated at the University of Chicago in 1880; taught in secondary schools in the United States until 1887, and then for four years in the Mito High School in Japan. He was teaching in America again until 1894, was principal of the Duncan Academy in Tokio until 1911, and then became a teacher in the First Higher School in that city. He was acting interpreter of the American legation, librarian and recording secretary of the Asiatic Society of Japan, editor of the *Japanese Evangelist* (1899–1909) and of the *Christian Movement in Japan* (1907–09), and a contributor to American and Japanese periodicals. He published: *A Handbook of Modern Japan* (1903; 9th ed., 1913); *Japanese Floral Calendar* (1904; 2d ed., 1911); *Christianity in Modern Japan* (1905); a revision of Hildreth's *Japan as It Was and Is* (1906); *Japanese Chronology* (1910).

CLÉMENT, klā'mäN', JACQUES (1567–89). The assassin of Henry III of France. He was born at Sorbon, in the Department of Ardennes, and in early life seems to have been a soldier. Later he entered a Dominican convent in Paris. Ignorant, passionate, and probably also demented, Clément became a fanatic partisan of the League in its struggle against the French King and Henry of Navarre. After the murder of the Duke of Guise and his brother, at Blois, in 1588, Clément began to think of himself as the instrument selected by Heaven to overthrow the "tyrant," i.e., Henry of Valois, and to avenge the death of the two great leaders of the League. He is said to have confided his plan to assassinate the King to Bourgoing, the prior of his convent, and to have received the latter's approbation. It is asserted also by historians friendly to the cause of Henry of Navarre that the plan was brought to the knowledge of the Cardinal of Mayenne and his sister, the Duchesse de Montpensier, and that it was, in fact, carried out with their assistance; but historians friendly to the League deny that its leaders had any previous knowledge whatever of Clément's murderous scheme. Letters of introduction to the King were obtained for Clément from the president, Harlay, and the Count de Brienne, who were then prisoners of the League in Paris. On July 31, 1589, Clément set out for Saint-Cloud, from where Henry III was directing the operations against the capital. On the morning of August 1 he was admitted to the presence of the King as the bearer of an important letter and, while the King was reading it, stabbed him. Henry threw the knife into the assassin's face, exclaiming: "Oh! the wicked monk; he has killed me! Put him to death!" Clément was immediately cut down, and his body was subsequently quartered and burned. The King died the next day. By the zealots among the Leaguers the deed was received with undisguised rejoicing, and according to Daubigné, a Protestant, the act of Clément was praised from the pulpit, and the monk declared a martyr. De Thou, a partisan of Henry IV, asserts that Pope Sixtus V lauded Clément, but both Daubigné's and De Thou's statements have no authority beyond their own assertion. For a defense of the assassination of Henry III, consult Pinselet, *Le martyre du frère Jacques Clément* (Paris, 1589). Consult also Baird, *The Huguenots and Henry of Navarre*, vol. ii, chap. 10 (New York, 1886), and authorities cited under HENRY III.

CLÉMENT, JEAN PIERRE (1809–70). A French political economist and historian, born at Draguignan. He was in the Ministry of Finance and a member of the Institute and wrote, with the aid of original documents, works on French financial administration, particularly in the epoch of Colbert, including: *Histoire de la vie et de l'administration de Colbert* (1846); *Histoire du système protecteur en France depuis Colbert jusqu'à la révolution de 1848* (1854); *Etudes financières et d'économie sociale* (1859); and *Lettres, instructions, et mémoires de Colbert* (7 vols., 1861–82). Clément's prefaces to the last work were collected and edited by his widow under the title *Histoire de Colbert et de son administration* (1874; 3d ed., 1892).

CLEM'ENT, JUSTICE. An "old merry magistrate" in Jonson's *Every Man in his Humour*.

CLEMENTI, klā-mĕn'tē, JACOPO DI, DA EMPOLI (often called CHIMENTI) (1554–1640). An Italian painter of the Florentine school, born in Florence. He was a pupil of Tommaso di San Friano (or Tridano) and was influenced by the works of Andrea del Sarto and Pontormo. Clementi's art marks the transition from the style of the Mannerists to the baroque. His manner is severe to rigidity, his treatment often realistic. His two principal works are "St. Ives in the Midst of the Widows and Orphans" (Uffizi), and the altarpiece of "San Borromeo with Members of the Rospigliosi Family," in San Domenico, Pistoia. Others are "Christ in Gethsemane" (Prado Museum, Madrid) and the "Sacrifice of Isaac" in the Serragli Church, Florence. He also painted excellent portraits. His only fresco is on the staircase of the Certosa, near Florence. Consult Giglioli, *Empoli artistica* (Rome, 1906).

CLEMENTI, klā-mĕn'tē, MUZIO (1752–1832). An Italian piano virtuoso and composer, born in Rome. His father, a goldsmith and fervent music lover, placed him under a relative, Buroni, for lessons in piano and harmony, and in 1761 Clementi became an organist. Later on, Carpani taught him counterpoint; and Sartarelli, singing. In 1766 an Englishman, Beckford, delighted with his playing, took him to England, where he continued his musical studies until 1770. He was now a finished virtuoso and published three piano sonatas (Op. 2)—the first works of this kind that bear the modern form. His success as a performer in London was extraordinary, and in 1777–80 he was cembalist (conductor) at the Italian opera there. His first tour (1781) included Strassburg, Munich, and Vienna, where his public contest with Mozart became an historic event, though the palm was awarded to neither. He aroused great enthusiasm in Paris (1785), but, in spite of it, decided to enter business. He returned to London, secured an interest in the publishing and piano-manufacturing firm of Longman and Broderip, and after its failure formed a partnership with Collard. The mechanical perfection of the piano absorbed most of his energies, yet he found time to write theoretical works and to give instruction—a field in which he had no rival. His concert tours in Russia (1802) and afterward in Germany and Italy were wonderfully successful; but his enterprises in London, by which he amassed a fortune, claimed most of his attention. He retired in old age to his estate at Evesham, outside London, and died there March 10, 1832. Among Clementi's pupils, Field, Cramer, Moscheles, Kalkbrenner, and Meyerbeer are the most noteworthy. Even Beethoven owes much to Clementi in his works for the piano. His style as a performer was that of a virtuoso, characterized by polish, vigor, and brilliancy, and a beautiful singing tone; and he especially excelled in improvisation. Of his works the sonatas, 106 in number, are brilliant and melodious, while his series of exercises, *Gradus ad Parnassum* (1817), remains an indispensable work in every pianist's equipment. Consult: Ferris, *Great Violinists and Pianists* (New York, 1894); Shedlock, *The Pianoforte Sonata* (London, 1895); Frojo, *Muzio Clementi, la sua vita, le sue opere e la sua influenza sul progresso dell' arte* (Milan, 1878).

CLEM'ENTI'NA, or PSEUDO-CLEMENTINE (sū'dō-klĕm'en-tīn) **WRITINGS** (Lat. nom. pl., from Gk. Κλημέντια, *Klēmentia*, from Lat. *Clemens*, Clement). 1. The "Second Epistle of Clement," a homily, perhaps originating in the East between 120 and 140 (see CLEMENT I). 2. Two Epistles to Virgins, discussing certain problems which had arisen in the growing practice of celibacy in the Church, of Syrian origin, dating from the third century. 3. The most important are the *Homilies*, *Recognitions*, and *Epitomes*, a collection of discourses and stories, bearing the name of Clement of Rome, of uncertain authorship and date, but in their present form not earlier than the beginning of the third century. The first external testimony to their existence is found in the *History* of Eusebius. The groundwork upon which the compilation rests may, perhaps, date from the second century. The pseudo-Clementine literature includes 20 *Homilies*, 10 *Recognitions*, and an *Epitome*, which were all written in Greek. The last is relatively unimportant. In the *Homilies* and *Recognitions* we have what purports to be the story of Clement's career, in company with his teacher, the Apostle Peter. The bulk of the narrative consists of an unsystematic and frequently interrupted account of the experiences of Peter with the archheretic Simon Magus, with whom he carries on doctrinal and ethical discussions, and whom he victoriously follows from place to place, founding churches on the way.

The theological position of the writer is clearly discernible. He is a Jewish Christian Gnostic, perhaps of the sect of Elkesaites (q.v.). He ignores (some would say, opposes) Paul and exalts the person of James, "the Lord's brother." The *Homilies* were compiled for the sake of the teaching contained, rather than for the sake of any historical narration. The *Recognitions* traverse the same general ground, but with variation of treatment and with greater attention to the story. Historical criticism has not yet reached definite conclusions on all the problems presented by these curious writings. That there has been more or less working over of earlier material is generally conceded. They seem to be based on a common source. Recent opinion inclines towards Syria as the probable home of the work on which the writings are based (Uhlhorn) and towards Rome as a possible source for the books in their present form (Harnack). But we have thus far no means of constructing even a plausible hypothesis as to the person or persons by whom they were recast.

Bibliography. Among editions of the pseudo-Clementine writings may be mentioned: the edition of the *Homilies* by Lagarde (Leipzig, 1865); of the *Recognitions* by Gersdorf (ib., 1838); of the *Epitome* by Dressel (ib., 1859); Eng. trans. in the *Ante-Nicene Fathers*, ed. by A. C. Coxe, vol. viii. Consult, in general: G. Krüger, *History of Early Christian Literature* (Eng. trans., New York, 1897); Harnack, *Geschichte der altchristlichen Litteratur*, vol. i (Leipzig, 1893); C. Bigg, "The Clementine Homilies," in *Studia Biblica et Ecclesiastica*, vol. ii (Oxford, 1890); Hort, *Notes Introductory to the Study of Clementina Recognitions* (London, 1901); Waitz, "Die Pseudo-Klementinen," in *Text und Untersuchungen zur Geschichte der altchristlichen Litteratur*, vol. x, p. 4 (Leipzig, 1904).

CLEMENTINA, klā'mĕn-tē'nà, LADY. A character in Richardson's novel *Sir Charles Grandison*.

CLEM'ENTINES (Lat. *Clementinæ*, sc. *leges*, laws, from *Clemens*, Clement). A collection of decrees and constitutions published by Pope Clement V in 1313. They constitute five books and 52 titles in the *Corpus Juris Canonici* and were edited and published by the Benedictines in 9 vols., with an appendix (1885–92).

CLEMENT OF ALEXANDRIA (Lat. *Clemens Alexandrinus*, Gk. Κλήμης Ἀλεξανδρεύς, *Klēmēs Alexandreus*) (c.150–c215). Titus Flavius Clemens, a celebrated Greek father of the Church. He was probably of heathen parentage, and his birthplace is unknown. He received a liberal education and sought out many teachers in his search for truth. He finally resorted to the Christian Pantænus, who presided over the catechetical school at Alexandria, and here he entered the Church. He was ordained a presbyter and succeeded Pantænus as head of the famous school, which was destined to achieve much greater renown because of the influence

of his own and Origen's teaching. During the persecution in the reign of Septimius Severus (c.203 A.D.) Clement left Alexandria. We hear of him afterward in Palestine and Asia Minor; but his later life is veiled in obscurity, and we know neither the place nor the date of his death.

Clement was a man of wide learning and was proficient in Greek philosophy, literature, and history. Jerome called him "the most learned of men"; but this is mere friendly exaggeration. As a theologian he ranks high, although inferior to his famous pupil, Origen (q.v.). According to his system, the divine Logos exhorts, educates, and perfects the true Christian gnostic, through a gradual process which is marked out, in three stages, in Clement's chief works—the *Exhortation to the Greeks*, the *Instructor*, and the *Stromata* ("miscellanies"), which together form a kind of trilogy. The first is a defense of the faith, designed to win converts. The second contains instructions in manners and morals for everyday life. In this Clement has not hesitated to draw freely from Stoic sources. The third is an unsystematic discussion of various points of doctrinal theology, designed to guide the mature Christian to a perfect knowledge (gnosis). He regarded Greek philosophy as a divinely inspired preparation for Christianity. Appended to the *Stromata* is one of the earliest Christian hymns, familiar to the modern world in the version beginning, "Shepherd of tender youth." Of Clement's other writings the best known is the tractate, *Who is the Rich Man that Shall be Saved?* In his interpretation of Scripture Clement followed the allegorical method, so much in vogue in Alexandria. The best edition of Clement's works is by Potter (Oxford, 1715), reprinted in Migne's *Patrol. Græc.*, vols. viii and ix (Paris, 1857). An English translation may be found in the *Ante-Nicene Fathers*, vol. ii, ed. by A. C. Coxe (New York, 1885). Consult, in general, the article "Clement," in Smith and Wace, *Dictionary of Christian Biography* (London, 1877–87); Charles Bigg, *The Christian Platonists of Alexandria* (Oxford, 1886); F. R. M. Hitchcock, *Clement of Alexandria* (London, 1899); Eugène de Faye, *Clément d'Alexandrie* (Paris, 1898).

CLEMENT OF ROME. See CLEMENT I.

CLEM'ENTS, FREDERIC EDWARD (1874–). An American botanist, born at Lincoln, Neb. He was educated at the University of Nebraska, where in 1894–1906 he was assistant professor of botany and then for a year professor of plant physiology. In 1907 he became professor and head of the department of botany at the University of Minnesota. His publications include: *The Phytogeography of Nebraska* (1898; 2d ed., 1900); *Histogenesis of Caryophyllales* (1899); *Laboratory Manual of High School Botany* (1900); *Greek and Latin in Biological Nomenclature* (1902); *Herbaria Formationum Coloradensium* (1902); *Development and Structure of Vegetation* (1904); *Research Methods in Ecology* (1905); *Plant Physiology and Ecology* (1907); *Cryptogamæ Formationum Coloradensium* (1908); *Genera of Fungi* (1909); *Minnesota Mushrooms* (1910); *Guide to the Trees and Shrubs of Minnesota* (1908); *Guide to the Spring Flowers of Minnesota* (1908; 3d ed., 1913); *Guide to the Autumn Flowers of Minnesota, Field and Garden* (1913).

CLEMENTS, JUDSON C(LAUDIUS) (1846–). An American politician and commerce expert, born in Walker Co., Ga. He was admitted to the bar in 1869 and practiced at LaFayette, Ga., from 1869 to 1892. He was county school commissioner in 1871, a member of the Georgia House of Representatives in 1872–76, and a member of the State Senate in 1877. From 1881 to 1891 he was in Congress and from 1892 to 1912 was a member of the Interstate Commerce Commission. He was reappointed to the commission in 1913. He published *Moral Results of Modern Transportation and Transmission Facilities* (1911).

CLEM'ENT'S INN. An Inn of Chancery, attached to the Inner Temple, in London. It originally served as a place of entertainment for those who made use of the waters of St. Clement's Well near by.

CLEMOW, FRANK GERARD. A British physician, educated in Liverpool, at Edinburgh University, and in Paris. He spent 15 months in India, served as medical officer to the British Seaman's Hospital, Cronstadt, and later became physician to the British Embassy at Constantinople. He was British delegate and plenipotentiary at the International Sanitary Conference in Paris in 1903 and in 1911–12. His publications include: *The Cholera Epidemic of 1892 in the Russian Empire* (1893); *The Medicinal Waters and Muds of Russia* (1897); *Medicine Past and Present in Russia* (1897); *Des formes cliniques de la peste* (1900); *The Geography of Disease* (1903); *Etude sur la défense sanitaire du chemin du fer du Hedjaz* (1910).

CLEMSON COLLEGE. An institution at Clemson College, S. C., chartered in 1889 and opened in 1893. Courses are offered in agriculture, mechanic arts, and electricity, chemistry, and textile arts. There are also military and academic departments. The institution is engaged in State work, such as the inspection of fertilizers, the protection of farmers against injurious insects and the diseases of animals, and in extension work among the farmers, teachers, etc. The student enrollment in 1912–13 was 834, and the instructors numbered 64. The college has an endowment fund of $154,439, and a total income of about $300,000. The value of grounds, buildings, and appliances in 1913 was $1,330,000. The president in 1914 was W. M. Riggs, B.S., LL.D.

CLE'OBU'LUS (Lat., from Gk. Κλεόβουλος, *Kleoboulos*). One of the seven wise men of Greece. He was the son of Evagoras and a native and ruler of Lindus, in Rhodes. He lived between 628 and 558 B.C., and was perhaps the first to give a literary form to riddles. He also wrote lyric poetry. Diogenes Laërtius has preserved for us several of his riddles. Consult Bergk, *Poetæ Lyrici Græci* (Leipzig, 1900).

CLE'OFAS, DON. The Spanish student for whose benefit Asmodeus exposes to view the secret life of all Madrid by unroofing the houses, in Le Sage's *Le diable boiteux*.

CLÉOMADÈS, klā'ō'mà'dès', THE ADVENTURES OF (Fr. *Les aventures de Cléomadès*). A French poem, of some 20,000 lines, written by Adenès le Roi towards the close of the thirteenth century.

CLEOM'BROTUS I (Lat., from Gk. Κλεόμβροτος, *Kleombrotos* (?–371 B.C.). A king of Sparta (380–371 B.C.). He was a son of Pausanias and succeeded his brother, Agesipolis I. He commanded the Spartan army which was sent against Thebes in 378 B.C.; two years later he led into Bœotia a second equally un-

successful expedition. He was defeated and killed in the battle of Leuctra (371 B.C.).

CLEOMEDES, klē'ō-mē'dēz (Lat., from Gk. Κλεομήδης, *Kleomēdēs*). A Greek writer on astronomy of the first or second century A.D. He composed a treatise, *The Circular Theory of the Heavenly Bodies,* which contains many truths of modern science—the spherical shape of the earth, the revolution of the moon about the earth, etc. The best edition is that by Ziegler (1891).

CLEOMENES (klē-ŏm'ē-nēz) **I** (Lat., from Gk. Κλεομένης, *Kleomenēs*). A king of Sparta. He was the son of Anaxandrides and came to the throne not later than 518 or 517 B.C. At the mandate of the Delphic oracle in 510 B.C. he assisted the Athenians in expelling from their city Hippias, the last of the Pisistratidæ. Shortly after this event he joined Isagoras, the head of the Oligarchical party at Athens, in an attempt to overturn the Clisthenian constitution. Clisthenes was driven from the city, and 700 families, partisans of Clisthenes, were sent into exile; but the undertaking, as a whole, proved unsuccessful. Later he made another unsuccessful attempt to aid Isagoras. At the time of the Ionic revolt he was appealed to in vain by Aristagoras to join the Grecian cause. In the war between Sparta and Argos, about the time of the capture of Miletus by the Persians, Cleomenes, having by stratagem defeated the Argives near Tiryns, treacherously slew a number of the survivors and destroyed the rest by setting fire to the grove in which they had taken refuge. Six thousand Argive citizens perished at this time, in and after the battle. By this victory Cleomenes won for Sparta supremacy in the Peloponnese. Afterward, by bribing the Delphic oracle, he secured the dethronement of his colleague, Demaratus, on the ground of illegitimacy (consult Herodotus, vi, 50–73), and the substitution for him of Leotychides. This he did because Demaratus had thwarted his attempt, in 491, to punish Ægina for submission to Darius. In his later years he became insane, finally taking his own life. Consult Wells, *Journal of Hellenic Studies* (1905).

CLEOMENES III (?–219 B.C.). A king of Sparta. He was the son of Leonidas II and the last of the Agidæ. (See AGIS.) He became King about 235 B.C. Cleomenes was the inheritor of the aspirations of King Agis IV; his aim was to do away with the ephorate at Sparta and to reassert the power of the kings and then to raise Sparta to the position of leader in Greece. His plans caused war between Sparta and the Achæan League (see ACHÆA) in 227 B.C.; in 226 Cleomenes twice defeated the Achæans in battle—at the foot of Mount Lycæus, in Arcadia, and at Leuctra, in the territory of Megalopolis. After this he abolished the ephorate, restored the prerogatives of the kings, made a redistribution of the lands, remitted debts, and extended the franchise to certain of the perioeci (q.v.). In 224 he utterly defeated the Achæans in a battle at Dyme, near Hecatombæum, but in 221 was himself defeated at Sellasia by the combined forces of the Macedonians and the Achæans, under the command of Antigonus, who had been called to the aid of the Achæans by Aratus and Philopœmen. Fleeing to Egypt, he there later endeavored to head an insurrection of the people, but, failing in that, took his own life. Cleomenes was the last great statesman that Greece produced.

CLEOMENES, or THE SPARTAN HERO. A play by Dryden and Southerne, produced in May, 1692.

CLE'ON. The Governor of Tharsus, in Shakespeare's *Pericles.*

CLEON (Lat., from Gk. Κλέων, *Kleōn*) (?–422 B.C.). An Athenian politician, champion of the democracy. He was a son of Cleænetus and was by trade a leather dealer. He first came into prominence by opposing Pericles; he caused Pericles to be convicted of maladminstration of public funds. In 427 B.C., when the matter of the treatment of the inhabitants of Mytilene, who had revolted against Athens, came up for consideration in the Athenian Assembly, he urged that all the inhabitants be put to death. In 425, when envoys arrived at Athens to treat of the release of the Spartan citizens shut up on the island of Sphacteria and to suggest peace, the Athenians, instigated by Cleon, imposed such terms upon Sparta that peace was found to be impossible. Later in the same year, owing to a casual remark made in the public assembly to the effect that, if *he* were general, the Athenians would not long remain in front of Sphacteria, Cleon himself was placed in charge of the operations against the island. He promised to end the siege within 20 days, and, in conjunction with Demosthenes, he did this. (See PYLUS.) In 422 B.C. Cleon was sent to oppose Brasidas (q.v.), in Macedonia and Thrace and to recover the city of Amphipolis. He took the towns of Torone and Galepsus, but was defeated and slain in the battle which took place beneath the walls of Amphipolis. Cleon is described by Thucydides and Aristophanes as an insolent and venal politician and a demagogue of low type. Both writers, however, had strong incentives to prejudices against him. Cleon was for many years the foremost man in Athens; he was a persuasive speaker, clever at managing public business in a popular way, and a strong advocate of war with Sparta. His death paved the way for the Peace of Niclas (q.v.), in 421 Consult: Grote, *History of Greece,* vol. vi (London, 1888); Beloch, *Die Attische Politik seit Perikles* (Leipzig, 1884); Holm, *History of Greece,* Eng. trans., vol. ii, chap. 23 (New York, 1902).

CLÉONTE, klā'ôNt'. A character in Molière's *Le bourgeois gentilhomme.*

CLE'OPA'TRA (Gk. Κλεοπάτρα). The name of several queens and princesses of Egypt of the family of the Ptolemies (q.v.). The most famous of them, CLEOPATRA VI, daughter of Ptolemy XIII, Auletes, was born in 69 or 68 B.C. Budge calls her the seventh; but Mahaffy declines to admit a Cleopatra VI (Tryphæna). Her father died in 51, leaving a will wherein he appointed as his successors, his elder daughter, Cleopatra, and his elder son, Ptolemy, and requested the Roman people to see his testamentary dispositions carried into effect. Two copies of this will were drawn up—one to be preserved at Alexandria (consult Cæsar, *De Bell. Civ.,* iii, 108), the other to be sent to Rome to be deposited in the public archives. Owing, however, to the unsettled state of the Empire, the latter will never reached its destination, but remained in the possession of Pompey. Cleopatra, then about 17 years old, and her brother, Ptolemy XIV, a child of about 12 years, succeeded jointly to the throne of Egypt, with the understanding that they should shortly marry. In the third year of their reign Ptolemy, urged by his advisers, assumed sole control of the government and drove

his sister into exile. She promptly gathered an army in Syria and prepared to assert her claims. It was at this time that Pompey, seeking refuge with the King of Egypt, after his defeat at Pharsalia, was murdered by the King's advisers. Cleopatra seems to have been unable to make good her claim by force of arms; but, shortly after Pompey's death, Cæsar arrived at Alexandria and, yielding to the fascinations of the Egyptian Queen, became her lover and espoused her cause. He was for a time hard pressed by the Egyptians, but ultimately triumphed, and Ptolemy lost his life. Arsinoë, the younger daughter of Ptolemy Auletes, was carried off to grace Cæsar's triumph at Rome. Cleopatra now nominally married her younger brother, Ptolemy XV, and, after settling their joint government upon a secure basis, went to Rome, where she lived as Cæsar's mistress until his assassination in 44 B.C. After Cæsar's death, having, it is said, poisoned her brother, Ptolemy XV, she returned to Egypt, where she associated with her on the throne her son by Cæsar, called Cæsarion. In the civil war following Cæsar's death, since Cleopatra had hesitated to take sides with either party, Antony, after the battle of Philippi (42), summoned her to meet him at Tarsus in Cilicia to explain her conduct. When she appeared upon the Cydnus on a splendidly adorned vessel, in the garb of the goddess Aphrodite, the Roman triumvir fell a victim to her charms and returned with her to Egypt. After living with her for some time, in the course of which she bore him twin children, Alexander Helios and Cleopatra Selene, Antony was compelled to return to Rome, where he married Octavia, a sister of Octavius. When, in 36, he went to the East in command of an expedition against the Parthians, he sent for Cleopatra, and she joined him at Antioch, and after his defeat she met him in Syria with troops and supplies. In 34, after a more successful campaign against the Parthians, he celebrated his triumph at Alexandria and continued to reside in Egypt. In 32 Octavianus declared war against Cleopatra, and Antony, in revenge, divorced his wife Octavia. Against the counsel of Antony's advisers Cleopatra insisted on taking part in the ensuing campaign. At the naval battle of Actium (31), believing Antony's defeat to be inevitable, she withdrew her fleet from action and fled to Alexandria. Her lover, beholding her flight, made no further effort to retrieve his fortunes, but retired from the battle and followed her. On the approach of Octavianus, Antony, deceived by the false report of the Queen's death, fell by his own hand. Cleopatra made some attempts to bring Octavianus under the influence of her charms, but, failing in this and hearing that he intended to exhibit her in his triumph at Rome, she killed herself (30 B.C.), probably by poison, and, according to an old tradition, by the bite of a venomous serpent. Cleopatra combined rare intellectual gifts with physical charms, and she is immortal as one of the most fascinating women of all time; so that ever since her death she has been a constant theme for artists, dramatists, and poets. There is no authentic portrait of Cleopatra extant, except in her effigy upon coins. A composite photograph has been made of these by Gorringe in his book, *Egyptian Obelisks* (New York, 1865).

Cæsarion, her son by Cæsar, was put to death by Octavius. Of her three children by Antony, her daughter CLEOPATRA married Juba, King of Mauretania, who was allowed by Octavius to take under his protection his wife's two brothers, Alexander and Ptolemy. In 40 A.D. Ptolemy, son of Juba and the younger Cleopatra, was slain by Caligula, and with him ended the line of the Ptolemies. (See PTOLEMY.) Consult: Strack, *Die Dynastie der Ptolemäer* (1896); Mahaffy, *The Empire of the Ptolemies* and *History of Egypt under the Ptolemaic Dynasty* (1899); Lombroso, *L'Egitto dei Greci e dei Romani* (1895).

CLEOPATRA. An opera by Enna (q.v.), first produced in Copenhagen, Feb. 9, 1894.

CLEOPATRA'S NEEDLES. The name given to two Egyptian obelisks of red syenite, which were transported from Heliopolis to Alexandria about 14 B.C., and remained there until 1877, when they were presented to the governments of Great Britain and of the United States by the Khedive, Ismail Pasha. One has been standing on the Thames Embankment, London, since 1878, the other in Central Park, New York, since 1880. The latter is 69 feet high, with a base 7 feet 7 inches square, and weighs 200 tons. It is supported on four bronze crabs, reproductions from the originals preserved in the neighboring Metropolitan Museum. The obelisk bears inscriptions of Thothmes III (about 1500 B.C.) and Rameses II. The London obelisk is slightly smaller than its companion in New York. Consult Gorringe, *Egyptian Obelisks* (New York, 1885). See OBELISK.

CLEP'SYDRA (Gk. *κλεψύδρα, klepsydra*, from *κλέπτειν, kleptein*, to steal + *ὕδωρ, hydōr*, water). An ancient instrument for measuring time by the efflux of water through a small orifice. Two kinds have been in use. In the simpler form the water was allowed to escape from one vessel into another. This form was used in the Athenian courts, where a speaker was allowed a certain quantity of water for his speech, the quantity depending on the importance of the suit. The more complicated form was said by some to have been invented by Plato, while others gave the honor to Ctesibius of Alexandria. In this form the water was allowed to flow at a uniform rate into a receptacle, on which was marked a scale of hours. Both forms are said to have been introduced into Rome in 159 B.C. and were widely used. (See CLOCK.) Athenæus (vol. iv, p. 174) applies the name to a variety of the hydraulic organ.

CLERC, klâr, JEAN LE. See LE CLERC, JEAN.

CLERC, LAURENT (1785–1869). A French deaf-mute and educator, born near Lyons. He was a favorite pupil of the Abbé Sicard at the institution of the deaf and dumb founded in Paris by the Abbé de l'Epée, and after eight years of study became a teacher. In 1816 he came to the United States with Dr. Gallaudet (q.v.), and the next year the two opened an institution for the deaf and dumb in Hartford, Conn., where Clerc taught successfully for more than 40 years. He married a deaf-mute, who bore him several children, all of whom had the sense of hearing and could speak. See DEAF-MUTE.

CLERESTORY. See CLEARSTORY.

CLERFAYT, or **CLAIRFAIT,** klâr'fâ', CHARLES DE CROIX, COUNT (1733–98). An Austrian field marshal, born at the castle of Bruille, Hainaut, Low Countries. He entered the Austrian service in 1753, fought with distinction in the Seven Years' War, and was advanced to the rank of colonel. During the Turkish War of 1787–91 he commanded an army

corps which won battles at Mehadia and Kalafat. In 1792 he commanded the Austrian corps sent to assist the Duke of Brunswick and defeated the French at Croix-aux-Bois (September 15). Having withdrawn into Belgium, he defeated the French at Aldenhoven (March 1, 1793), relieved Maestricht, decided the battle of Neerwinden (March 18), and took Le Quesnoy (September 11). After this series of brilliant victories he met with reverses at Wattignies (October 15 and 16), Mouscron (April 29, 1794), and Hoogleede (June 13). In 1795 he was appointed field marshal and commander in chief of the Imperial armies on the Rhine, in which capacity he defeated Jourdan at Höchst (October 11) and relieved Mainz, storming the almost impregnable works of the besiegers, which were defended by an army of 80,000 men. After concluding an armistice with the French Republic he returned to Vienna, where he was hailed as the savior of the Empire. Because of differences with the Imperial Minister Thugut over the armistice, he left the army. Consult Vivenot, *Thugut, Clerfait, und Wurmser* (Vienna, 1869).

CLERGUE, Francis Hector (1856–). An American manufacturer, born in Bangor, Me., of French Huguenot ancestry, and educated at the University of Maine. He studied law and was admitted to the bar in 1876, but in 1880 became interested in street railways and other developments. In 1888 he attempted unsuccessfully to organize a railway and electric light and water works companies in Teheran. In 1896 he began to develop hydraulic power at the falls of the St. Mary, and it was largely through his efforts, and in some cases his inventions, that in Sault Ste. Marie, Mich., and in the city of the same name in Ontario, great wood-pulp factories and reduction works were built.

CLERGY (OF. *clergie,* Lat. *clericus,* from Gk. *κληρικός, klērikos,* clergyman, from *κλῆρος, klēros,* lot). A term very generally applied to the ministers of the Christian religion in contradistinction to the laity (q.v.). This use of the term is very ancient and appears to have gradually become prevalent, as the ministers of religion more and more exclusively, instead of the members of the Christian Church equally, began to be regarded as God's "heritage" and "priesthood" (1 Pet. ii. 9, and v. 3), consecrated to Him, and peculiarly His. The distinction between the clergy and the laity became more marked through the multiplication of offices and titles among the clergy, the ascription to them of a place in the Christian Church similar to that of the priests and Levites in the Jewish church, with peculiar rights and privileges, their assumption of a peculiar dress and of official insignia, the growth of monastic institutions, and the introduction of celibacy. In harmony with the notions on which this distinction is founded is that of an indelible, sacramentally stamped character derived from ordination, so that a renunciation of the clerical office is either viewed as an impossibility or a sort of apostasy. These notions in their highest degree belong to the Church of Rome. In the Protestant churches the distinction between clergy and laity is much less wide, and, although the same terms are often used, it is rather conventionally than in their full signification. The employment of official robes by the clergy preceded their assumption of a peculiar ordinary dress and is not so intimately connected with any peculiar pretensions. Among the privileges accorded to the clergy by the Roman emperors and in the Middle Ages was exemption from civil offices; among the rights asserted by them, and occasioning much dispute, was exemption from lay jurisdiction, even in cases of felony. (See Benefit of Clergy.) The clergy were distinguished into the *higher* clergy and the *lower* clergy; the latter including ostiarii, acolytes, lectors, exorcists, etc. The term *secular* clergy is the designation of priests of the Church of Rome who are not of any religious order, but have the care of parishes. Monks who are in holy orders are designated *regular clergy* (from *regula,* rule). See Orders, Holy; Bishop; Priest; Deacon.

CLERGY, Benefit of. See Benefit of Clergy.

CLERICUS, Johannes (1657–1736). See Le Clerc, Jean.

CLERIDÆ. See Checkered Beetles.

CLERK (AS. *clerc, cleric,* from Lat. *clericus,* clergyman). In the Middle Ages, an appellation for an ecclesiastic, extended at a later period to mean a complimentary title for men of learning, whether of the Church or not. In modern times it indicates any one who makes and keeps records, public or private, or one employed in some subordinate position in a store, an office, etc. "Clerk in holy orders" and "clerk in minor orders" are phrases, still used in England as the legal designations of a minister of the Established church, which preserve the mediæval use of this term. See Clergy.

CLERK, Parish. See Parish Clerk.

CLERK, Paymaster's. In the United States navy a paymaster's clerk is appointed by the Secretary of the Navy at the request of the paymaster for whom he is to perform duty and serves until his appointment is revoked. Paymasters' clerks have the same pay and allowances as warrant officers, and, while holding appointments in the naval service, they have the same rights of retirement as warrant officers of a like length of service. The uniform is similar to that of warrant officers (see Boatswain), and they belong to the warrant officers' mess.

CLERK, Dugald (1854–). A British engineer and inventor, born at Glasgow, and educated at Anderson's and the West of Scotland Technical colleges (now merged). He was professor of technical chemistry at Glasgow and also in the Yorkshire College of Science at Leeds, became a director of the National Gas Engine Company, and invented the Clerk cycle gas engine. Besides his scientific papers he is author of: *The Theory of Gas Engines* (2d ed., 1891); *The Gas and Oil Engine* (7th ed., 1896); *The Gas, Petrol, and Oil Engine* (2 vols., 1909–13).

CLERKE, Agnes Mary (1842–1907). A British astronomer, born in Ireland. While living in Italy in 1870–77 she contributed to the *Edinburgh Review.* In 1888 she made astronomical observations at the Cape of Good Hope, South Africa, and in 1890 further observations aboard the yacht *Palatine* in the Baltic Sea. She won the Actonian prize for her work in astronomy in 1893. Her publications include: *A Popular History of Astronomy* (1885; 4th ed. rev., 1902); *The Systems of the Stars* (1890; 2d ed., 1905); *The Herschels and Modern Astronomy* (1895); *Astronomy* (1898);

Problems in Astrophysics (1903); *Modern Cosmogonies* (1905).

CLERKENWELL, klär'ken-wĕl (clerks' well, Lat. *Fons Clericorum,* from its well, which was a meeting point for the parish clerks of London). A parish of London (q.v.), England, north of St. Paul's Cathedral, between Holborn Viaduct and Islington. It is a noted district for the manufacture of metal articles, watches, and optical instruments. Northampton Polytechnic Institute, a branch of the City Polytechnic Institute, is situated on Northampton Square.

CLERK-MAXWELL. See MAXWELL.

CLERMONT-EN-BEAUVAISIS, klâr'môn'-ôn-bō'vā'sē', **CLERMONT-DE-L'OISE** (ML. *Clarus Mons,* fair hill, from *clarus,* clear, and *mons,* mountain). An ancient town in the Department of Oise, France, 36 miles north of Paris (Map: France, N., H 3). The town hall and church of St. Samson date from the fourteenth century, and above the town is an old castle of the tenth or eleventh century, now used as a penitentiary for women. Founded on the site of an ancient camp of the Gauls and Romans, Clermont was important in the Middle Ages, was frequently taken and retaken in the wars with the English, and in 1487 was surrendered to them as a ransom for the French leader, La Hire. It manufactures felt and corsets, and its trade consists of horses, cattle, and grain. Pop., 1901, 5723; 1911 (commune), 6004.

CLERMONT-FERRAND, -fĕr'räN'. The capital of the Department of Puy-de-Dôme, France, 215 miles south-southeast of Paris (Map: France, N., J 7). It is finely situated, on a gentle elevation, between the rivers Bedat and Allier, at the foot of a range of extinct volcanoes, crowned by the peak of Puy-de-Dôme, about 5 miles distant from the town. It consists of the two towns of Clermont and Montferrand, connected by a fine avenue of trees, but has a generally gloomy aspect. It contains several remarkable buildings; such as the old Gothic cathedral of the thirteenth century, the corn and linen hall, the theatre, museum of natural history, hospital, including a college of pharmacy, medicine, academy of sciences, belles lettres and arts, and a public library, in which are over 113,000 printed volumes and 1100 manuscripts. In the park outside of the library is a statue of Pascal, who was born here. It is the centre of the French manufacture of India rubber. Other manufactures include woolen and linen goods, machinery, straw hats, chocolate, chemicals, rope, candles, hats, yarn, thread, animal oils, and needles, while there is an extensive traffic in the produce of the district, and considerable transit trade between Paris and the south of France. It is an active market for horses. There are two hot mineral springs in the town, which are used for bathing. Clermont-Ferrand is the seat of a bishop. Pop. (commune), 1901, 52,933; 1911, 65,386. It succeeds the ancient Gallic city, Augusta Nemetum, later called Clarus Mons. In the Middle Ages Clermont was the residence of the counts of the same name, and the capital of the Province of Auvergne, and became the seat of one of the oldest bishoprics of France. Several ecclesiastical councils were held here, the most remarkable of which was that in 1095, at which the First Crusade was decreed by Urban II.

CLERMONT-GANNEAU, -gȧ'nō', CHARLES SIMON (1846–). A French Orientalist, born in Paris and educated at the Ecole des Langues Orientales. Becoming an attaché to the Jerusalem consulate, he took an important part in the discovery of the "Moabite Stone" (q.v.) and its piecing together. The British government made him head of an expedition to Palestine in 1874, and the French government afterward sent him on archæological missions in Syria, Tripolitana, Cyrenaica, etc. He became Vice Consul at Jaffa in 1880, Oriental "secrétaire interprète" in Paris in 1882, Consul of the first class (1886), Consul General (1896), Minister Plenipotentiary (1906), and professor of Semitic epigraphy and antiquities at the Collège de France. He exposed various forgeries, notably the "Moabite" pottery sold to the Prussian government by Shapira, Shapira's pretended fragments of Deuteronomy, and the tiara of Saitaphernes. He published: *Etudes d'archéologie orientale* (1880); *Palestine inconnue* (1886); *Les fraudes archéologiques* (1885); *Archæological Researches in Palestine* (2 vols., 1896–99); *Recueil d'archéologie orientale* (1885–1905).

CLERMONT L'HÉRAULT, -lā'rō', or CLERMONT DE LODÈVE. The capital of a canton in the Department of Hérault, France, situated on a castle-crowned hill, rising from the banks of the Ydromiel, 10 miles south of Lodève by rail (Map: France, S., H 5). Its Gothic church is a fine building of the thirteenth and fourteenth centuries. Clermont is noted for its woolen manufactures, especially army clothing, which date from 1678; it has also tanneries, potteries, manufactures of cutlery, hats, wine, lime and stone quarries, and a considerable trade in agricultural and commercial products. Pop., 1901, 5280; 1911, 5177. Consult Brien, *Histoire de la ville de Clermont l'Herault et de ses environs* (Clermont l'Herault, 1838).

CLERMONT TONNERRE, -tô'nâr'. A well-known French family. It originated in Dauphine in the eleventh century.—STANISLAS MARIE ADELAIDE, COUNT DE (1757–92), was born at Pont-à-Mousson. He entered the States-General in 1789 as representative of the nobility, and there, as well as in the National Assembly, acquired great influence. He was moderate in his views, argued for the English system of two legislative houses and for the King's right to veto. With Malouet he founded, in 1790, in order to counteract the Jacobins, the Club des Impartiaux (later called Amis de la Monarchie), and with Fontanes he published the *Journal des Impartiaux.* He perished in the massacre of Aug. 10, 1792. A great orator, he collected his speeches, *Recueil des opinions* (Paris, 1791).—AIMÉ MARIE GASPARD, MARQUIS, and afterward DUKE DE (1779–1865), born in Paris, was a French general and minister. He was educated at the Ecole Polytechnique, entered the army, and served in the campaigns in Italy, Germany, and Spain. He was made aid-de-camp to Napoleon's brother Joseph, King of Spain. After the restoration of Louis XVIII he was Minister of Marine and in 1823–27 Minister of War. After the July revolution he refused the oath of allegiance to the new government and retired from politics.

CLERON. See HAUSSONVILLE.

CLE'RUCHY. See COLONY.

CLÉRY, klā'rē', JEAN BAPTISTE ANTOINE HANET (1759–1809). The valet de chambre of Louis XVI. He was born near Versailles. By his own choice he followed the King to the Tem-

ple and attended him with the greatest devotion. After his death he remained in imprisonment for some time and then rejoined the royal family in Germany. In London he published a popular account of Louis's captivity, *Journal de ce qui s'est passé à la tour du Temple pendant la captivité de Louis XVI, roi de France* (1798), which greatly aided the Royalist cause and may have been written by some one else.

CLÉSINGER, klā'zăN'zhā' (JEAN BAPTISTE) AUGUSTE (1814–83). A French sculptor and painter. He was born at Besançon, studied with his father and in Italy, and first attracted attention with a bust of Eugène Scribe (1844), and with his "Woman Bitten by a Serpent" (1847). Other important works are: Rachel as "Phædra," "Tragedy" (vestibule of Théâtre Français), "Cleopatra before Cæsar," the silver statue of "Phryne," "Louise of Savoy" (Luxembourg Gardens), "George Sand" (Théâtre Français), and the statue of "Music" on Chopin's grave (Père Lachaise). His work is of masterly technique and refined in composition, but is often lacking in content. He occasionally exhibited paintings of scenery and architecture. In 1847 he married a daughter of George Sand. He died in Paris, Jan. 7, 1883.

CLETUS. See ANACLETUS I.

CLEVEDON, klēv'don. A watering place in Somerset, England, on the Bristol Channel and Severn Estuary, 9 miles northeast of Weston-super-Mare (Map: England, D 5). It has a fine beach, a marine promenade, a pier, and a coast-guard station. It is noted for literary associations with Coleridge; also with Henry Hallam, the historian, and his son Arthur, commemorated by "In Memoriam," whose graves are in the parish church of St. Andrew. Clevedon Court, a mediæval mansion, is supposed to be "Castlewood" of Thackeray's *Henry Esmond.* Pop., 1901, 5900; 1911, 6111.

CLEVE'LAND (ME. *clif, clef,* pl. *clives, cleves,* cliffs + *land*). A hilly region with some picturesque fertile valleys, forming the eastern part of the North Riding of Yorkshire, England, between Whitby and the Tees (Map: England, E 2). Some of the heights are marked by mounds called "houes." Many archæological relics have been found among the hills. Since 1851 it has become a populous mining district, owing to the discovery of ironstone. See MIDDLESBROUGH.

CLEVELAND. The county seat of Cuyahoga Co., Ohio, the largest city of the State, and the sixth in the United States, the chief port of entry of the Great Lakes, and an important industrial and commercial centre, situated on the south shore of Lake Erie, at the mouth of the Cuyahoga River, in lat. 41° 30′ 5″ N., long. 81° 42′ 6″ W. (Map: Ohio, G 2). It is 138 miles by rail northeast of Columbus, 263 miles northeast of Cincinnati, 357 miles east of Chicago, 623 miles west by north of New York, and 527 miles northwest of Washington.

The city, 689 feet above sea level, and, at its highest point, 302 feet above the lake, is beautifully situated on elevated land, which slopes gently towards the lake, and occupies an area of 51.8 square miles, with a river frontage of 18 miles, and a lake frontage of 12 miles, extending back more than half that distance. It is divided unevenly by the winding course of the Cuyahoga River, the largest portion lying on the east side of that stream. It is intersected also by Kingsbury and Walworth "runs," the east and west tributaries of the Cuyahoga. The land bordering the river is low and flat, and here lie many of the industrial works—lumber and coal yards, ore docks, blast furnaces, steel mills, etc.—almost hidden from view. Owing to the variation in level of different parts of the city, there are several elevated viaducts and many bridges (nearly all of which are owned by the municipality) spanning the Cuyahoga and uniting the sections of the city. The most remarkable of these is Superior Avenue Viaduct of stone and iron, completed in 1878, at a cost of $2,250,000, 3211 feet long and 64 feet wide, with a central drawbridge 68 feet above the water level. This structure will soon be supplanted by a magnificent high-level bridge, affording mast clearance for any boat, having separate decks for different kinds of traffic, and costing $4,000,000. The Central Viaduct, completed in 1888, and reconstructed into a high-level bridge in 1913, crosses the river and is 2838 feet long. The Abbey Street Viaduct, crossing Walworth Run, is 1092 feet long. A smaller one (835 feet) spans Kingsbury Run. Just outside the city, spanning Rocky River, is to be found the second largest concrete bridge in the country.

Cleveland has features of beauty in its broad streets, ranging from 40 to 132 feet in width, which are so abundantly shaded that the city has acquired the name of "Forest City." There are 769.8 miles of streets (excluding Newburgh), 458 miles of which are paved, brick and asphalt being extensively used. The public-park system includes about 1902 acres, exclusive of land acquired for the "group plan," distributed in areas of varying extent throughout the city, and its suburban districts to the east and west are thoroughly accessible by the street railways, which operate 300 miles of track. In contrast with its extensive industrial and commercial interests, Cleveland has very few large tenements, with congested population. Detached houses with gardens are the rule. In 1910 it had 90,465 dwellings, which, when compared with its population, makes Cleveland preëminently a city of homes.

The lake-shore front, the valley of the Cuyahoga and the area along the Pennsylvania Railroad from St. Clair Avenue south to Harvard Avenue and along the Erie Railroad from East Fifty-fifth Street to East Ninety-third Street, are centres of the manufacturing industry, while the business area extends from the lower part of the river east along Superior Avenue, which is 132 feet wide, and along Euclid Avenue to East Twenty-second Street. The Public Square, or Monumental Park, containing the statue of Gen. Moses Cleaveland and the Soldiers' and Sailors' Monument, forms a park of 4½ acres about the intersection of Superior Avenue and Ontario Street; from this centre and from Ontario Street, which extends north and south, the principal streets of the east side of the city diverge. The far-famed Euclid Avenue, 83 to 90 feet wide, begins at the southeast corner of the Public Square and extends beyond Lake View Cemetery, through the suburbs of East Cleveland, the continuation beyond there being Euclid Road. Once called by Bayard Taylor the most beautiful thoroughfare in the country, in recent years it has lost much of its former natural attractiveness and character as a residence street by reason of the steady encroachment of the business district. Among the fine residence streets of the city are Bellflower

Road, Magnolia and Juniper Drives, East and Lake Shore boulevards, East Seventy-fifth, East Seventy-ninth, East Ninety-third, East One Hundred and Fifteenth, and West Fourteenth streets. Lying partly in the city are Lake Avenue and Clifton Boulevard, while outside of Cleveland, but maintained by the city, are the beautiful boulevards of Euclid Heights and Shaker Lakes.

Buildings. The more prominent buildings of the city include the new County Courthouse, new City Hall, Federal Building, Art Museum, Western Reserve Historical Society Building, Chamber of Commerce, Central Armory, Cleveland Grays' Armory, Adelbert College, Women's College, Case School of Applied Science, Northern Ohio Insane Asylum, new Young Men's Christian Association Building, American League Park buildings, Sheriff Street Market House (400 by 120 feet), and the new West-Side Market House, reputed to be the finest in America. Cleveland has come to be a "City of Arcades." The largest, the Superior Arcade, 400 by 180 feet, built in 1889 at a cost of $850,000, has a fine interior; arranged on both sides of a central court are the several tiers of stores and offices fronted by balconies. Between East Sixth and East Ninth streets, on the opposite side of Euclid Avenue, and extending through to Prospect Avenue S. E., are successively the Euclid, Colonial, and Taylor arcades. At the Prospect Avenue end of the Colonial Arcade is the Colonial Hotel. Other structures worthy of note are the *Leader-News*, Engineers (national headquarters of the Brotherhood of Locomotive Engineers), Williamson, New England, Society for Savings, Citizens, American Trust, Schofield, Rose, Perry-Payne, Garfield, Cuyahoga. Illuminating, Park, Marshall, Union Club, Kinney-Levan, Cleveland Athletic Club, Caxton, and Hippodrome buildings. The Euclid Avenue and Pilgrim (Congregational), St. Paul's and Trinity (Protestant Episcopal), the First Methodist Episcopal and Epworth Memorial, Calvary (Presbyterian), East End Baptist, Euclid Avenue Christian Church, St. Michael's, St. Prokop's, and the Roman Catholic Cathedral and the Euclid Avenue Synagogue are among the finest ecclesiastical edifices.

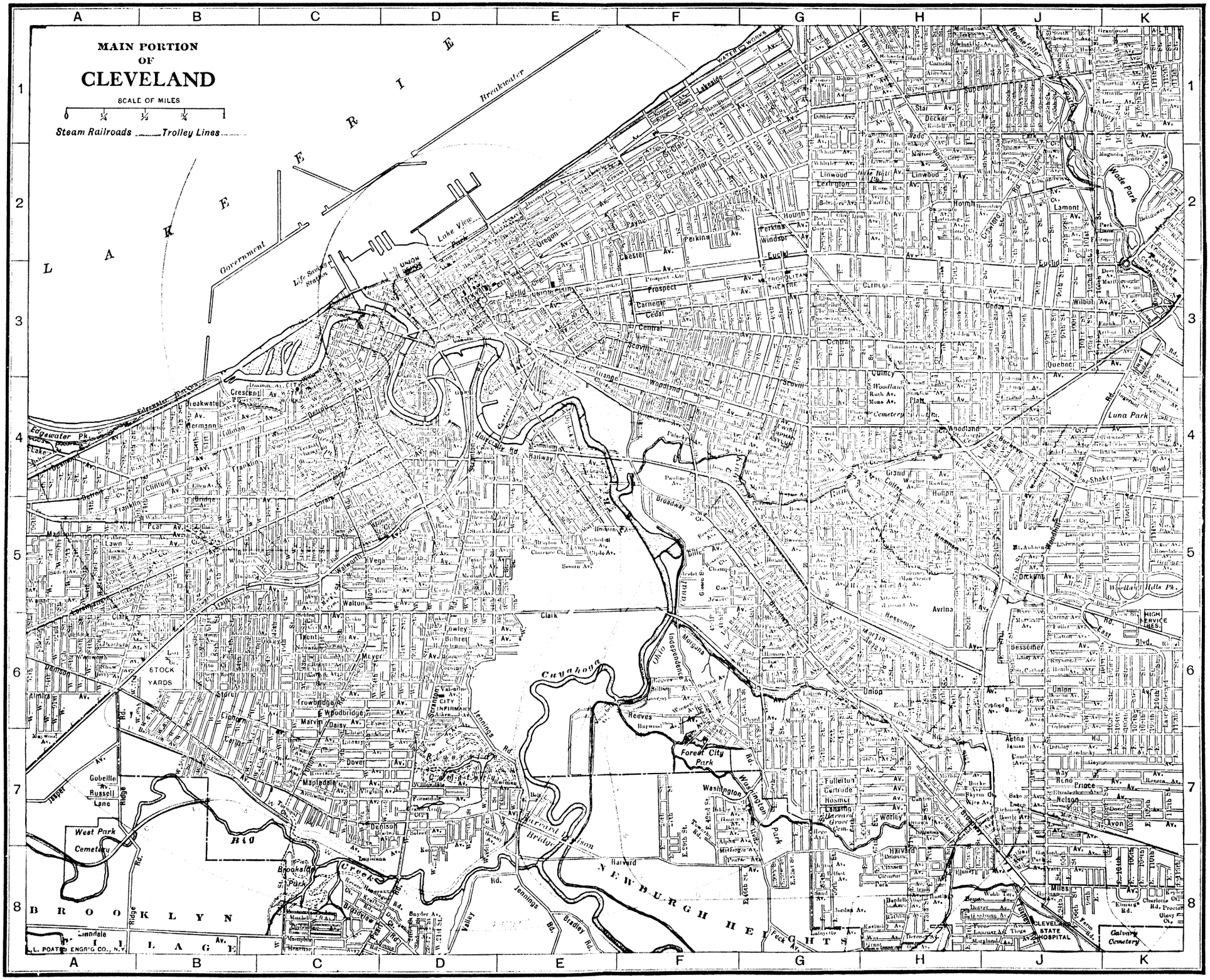
In the early part of the century a plan was conceived by the late Mayor Tom L. Johnson and initially projected by architects Arnold Brunner, John M. Carrere, and D. H. Burnham, systematically to beautify the city by grouping the public buildings that are gradually replacing the present structures—an undertaking to which $35,000,000 will ultimately be devoted. The public buildings are being arranged in a quadrangle inclosing a mall, the whole occupying a plot of land in the heart of the city one-eighth of a mile wide by one-half a mile long. With the erection of the Federal Building, the County Courthouse, and the City Hall, one-half of the "group plan" is now finished. There still remain to be erected the Public Library Building and Museum at the south end, and the new monumental union railroad station at the north end of the mall. An imposing Court of Honor will join the buildings at each end of the mall.

Parks and Cemeteries. Among the many fine parks belonging to the city, the largest within the city limits is Rockefeller Park, of 273 acres, a part of which was given by the millionaire whose name it bears. It includes the Valley of Doan Brook, with several smaller parks and parkways, and is connected with Gordon and Wade parks by the boulevard which extends also between these two. Gordon Park, on the lake front, comprises 112 acres and, with Wade Park (85 acres) to the southeast, is noted for its gardens. The former contains the statue of Commodore Perry, formerly in Monumental Park, the Goethe-Schiller Monument and the new Art Museum. Edgewater Park (126 acres) has well-kept lawns, walks, and a beach, with facilities for boating and bathing, a municipal dance hall, and contains the Wagner Monument. Brookside Park (159 acres), containing the city's zoölogical gardens; Garfield Park (181 acres); Woodland Hills Park (113 acres); Shaker-Heights Park (279 acres), just outside the city limits, and named from the community which once occupied the land; Lakeview Park, on the lake shore; Lincoln Park; Washington Park (98 acres); Forest Hill Parkway (81 acres); University Circle on the east side, and Franklin Circle on the west side of the river, are noteworthy. Besides Euclid Avenue, the more attractive drives are the boulevard system of 33 miles, connecting the parks, and Lake Avenue and Clifton Boulevard.

Cleveland has a number of cemeteries, the largest of which are Woodland, Riverside, and Lakeview. The last, one of the most beautiful in the country, contains more than 300 acres, with great natural advantages skillfully improved. Here, on an eminence 250 feet above the level of the lake, stands the Garfield Memorial, completed in 1890 at a cost of $225,000—the balcony near the top, 165 feet high, affording a fine view of the city and its suburbs. It is built principally of Ohio sandstone and contains a chapel with symbolical panels and reliefs of scenes from the President's career and his statue. His remains lie in a crypt beneath.

In Lakeview Cemetery is situated the Wade Memorial Chapel, which cost more than $350,000.

Educational Institutions and Libraries. Cleveland has the normal equipment of a great city in the matter of public schools, with a sufficient number of high, technical, and commercial schools, besides numerous private and parochial institutions. The public-school system is conducted under the supervision of a small elective board, and its plan of instruction prohibits all corporal punishment, eliminates mechanical methods, introduces manual and domestic training in all grades, and practically abolishes stated written examinations in the primary and grammar grades—the teacher's judgment being accepted as the general basis of promotion. Cleveland was one of the first cities in the United States to establish a free high school, and the first west of the Alleghany Mountains, the date being July 13, 1846. It is the seat of Western Reserve University (q.v.), with its departments of Adelbert College, Women's College, Graduate School, and schools of medicine, law, pharmacy, library, domestic science, journalism, and dentistry; Case School of Applied Science (q.v.); and St. Ignatius College (Roman Catholic). It contains also St. Mary's Theological Seminary (Roman Catholic), Baldwin University Law School, Cleveland College of Law, and Cleveland Pulte Medical College. Cleveland is also the home of the National Mouth Hygiene Association, whose purpose is to correct general mouth evils existing in the schools.


MAIN PORTION
OF
CLEVELAND
SCALE OF MILES
0 ¼ ½ ¾ 1
Steam Railroads
Trolley Lines
L A K E E R I E
Breakwater
Government
Lake View Park
Life Saving Station
Edgewater Pk.
Edgewater Park Co.
Lake Av.
Detroit
Franklin
Clinton
Madison
Lawn
Clark
Walton
Vega
Trent
Meyer
Lowley
Bibbert
Dawson
Almira
STOCK YARDS
Storer
Eighteen
Cerial
Trowbridge
Woodbridge
Marvin
Daisy
Dover
Mapledale
Virginia
Gobeille
Russell
Lane
Ridge
West Park Cemetery
Big Creek
Brookside Park
Denison
Emmaline
Snyder Av.
Valley
Jennings Rd.
Bradley Rd.
B R O O K L Y N
L. POATES ENGR'G CO., N.Y.
Crescent Av.
Breakwater
Hermann
Hillman
Detroit
Franklin
Bridge
Water Works
Lakeside
Superior
Rockefeller
Star Av.
Decker
Dibble Av.
Wade Park
Linwood
Lexington
Lamont
Payne
Oregon
Perkins
Windsor
Euclid
Chester Av.
Prospect Av.
Carnegie
Cedar
Central
Scovill
Woodland
Quincy
Woodland Ruth Av.
Mona Av.
Cemetery
Quebec
Wilbur Av.
Ontario
Luna Park
Hallway
Broadway
Pauline Av.
Clarence Ct.
Clyde Av.
Sweet Av.
Dille Av.
Grand Av.
Holton
Bessemer
Avrina
Morgana
Independence
Ohio
Canal
Cuyahoga
Union
Reeves
Haywood
Forest City Park
Forest City Hospital
Jennings Rd.
Washington
Washington Park
Harvard
Harvard Bridge
Newburgh Heights
Fullerton
Gertrude
Hosmer
Lansing
Worley
Aetna
Prince
Nelson
Avon
Miles
Cleveland State Hospital
Calvary Cemetery
Charlotte
Proctor
Quincy Ct.
High Service Res.
Wade Park Av.
Euclid Av.
Prospect Av.
Carnegie Av.
Woodland Av.
Quincy Av.
Quebec Av.
Wilbur Av.
Ontario
Lake Shore Blvd.
East 9th St.
East 55th St.
East 105th St.
East 116th St.
Broadway
Dille Av.
Bessemer Av.
Union Av.
Harvard Av.
Miles Av.
Lansing Av.
Worley Av.
Fullerton Av.
Gertrude Av.
Hosmer Av.
Aetna Av.
Prince Av.
Nelson Av.
Avon Av.
Lamont Av.
Holton Av.
Linwood Av.
Lexington Av.
Perkins Av.
Windsor Av.
Euclid Av.
Chester Av.
Prospect Av.
Carnegie Av.
Cedar Av.
Central Av.
Scovill Av.
Woodland Av.
Quincy Av.
Quebec Av.
Wilbur Av.
Ontario
Lake Av.
Edgewater Pk.
Detroit Av.
Franklin Av.
Clinton Av.
Madison Av.
Lawn Av.
Clark Av.
Walton Av.
Vega Av.
Trent Av.
Meyer Av.
Lowley Av.
Bibbert Av.
Dawson Av.
Almira Av.
Storer Av.
Eighteen Av.
Cerial Av.
Trowbridge Av.
Woodbridge Av.
Marvin Av.
Daisy Av.
Dover Av.
Mapledale Av.
Virginia Av.
Gobeille Av.
Russell Av.
Lane Av.
Ridge Rd.
West Park Cemetery
Denison Av.
Emmaline Av.
Snyder Av.
Valley Rd.
Jennings Rd.
Bradley Rd.
Brookside Park
Big Creek
Cuyahoga River
Ohio Canal
Independence
Morgana
Forest City Park
Forest City Hospital
Jennings Rd.
Washington Park
Harvard Bridge
Newburgh Heights

In addition to libraries of the various educational institutions, Cleveland has a Public Library of nearly 550,000 volumes, the Case Library (subscription) of 85,000 volumes, the Hatch Library (Adelbert College) of 80,000 volumes, Cleveland Medical Library Association, Law Library Association, and the Western Reserve Historical Society.

Charities. The State Institution for the Insane, founded in 1855, has 103 acres of ground and buildings that accommodate 1750 patients. The City Infirmary and Hospital treat annually 4500 patients and maintain a department for outdoor relief. A tract of over 2000 acres, lying south of the city, has been purchased for the purpose of colonizing the inmates of the infirmary and workhouse and for maintaining a tuberculosis sanitarium. Other hospitals include the Lakeside Hospital, Federal Marine, Cleveland General, Cleveland Homeopathic, St. Alexis, St. Clair, St. John's, and St. Vincent's Charity. Other institutions are industrial schools, homes for the aged, and Jewish, Roman Catholic, and Protestant orphanages. Prominent in the charitable work is the Goodrich House, incorporated in 1897—a social settlement in the poorer part of the city, which contains clubs, kindergartens, a gymnasium, baths, sewing rooms, a public laundry, and parlors and reading rooms. With this equipment the Goodrich House stands among the foremost institutional houses in the United States. The Hiram House and Alta House are prominent social settlements. It is estimated that the charitable institutions control property exceeding in value $5,000,000.

A unique innovation in coöperative benevolence is to be found in the Cleveland Federation for Charity and Philanthropy, established in 1913. Its purpose is to secure greater efficiency and economy in giving by harmonizing the work of the charitable and philanthropic organizations of the city. The federation is controlled by a board of 30 trustees, one-third elected by the participating philanthropic organizations, one-third by the givers, and one-third by the Chamber of Commerce to represent the city at large. Another remarkable institution is the Cleveland Foundation, a "Community Trust," organized in 1913, and controlling millions of dollars bequeathed for educational and charitable purposes. The income from the foundation funds is expended by an impartial, nonsectarian, nonpolitical committee, serving without compensation. No two members may be of the same religious denomination, the *personnel* changes by one member each year, and the committee is composed of residents who are informed concerning the educational, social, civic, and charitable needs of the city.

Clubs, Theatres, and Hotels. The Union, Roadside, Tavern, Colonial, Rowfant, Excelsior, and the Euclid and Country clubs, all owning the houses in which they are installed, are representative organizations. Among the principal places of amusement are the Euclid Avenue Opera House, Keith's Hippodrome, and the Colonial, Metropolitan, and Duchess theatres. The more prominent hotels include the Hollenden, Colonial, Hotel Euclid, Statler, Gillsy, Tavistock, Forest City, and American.

Commerce and Industry. The construction of the Ohio Canal—completed in 1832—connecting Lake Erie with the Ohio River, the northern terminus being the Cuyahoga River, gave Cleveland commercial advantages over other cities on Lake Erie; and, though the canal has since declined greatly in importance, the city has now other and greater advantages by virtue of its location. Chief of these is its proximity to the coal and oil fields of Ohio and Pennsylvania and to the iron-producing regions of Lake Superior, Cleveland being one of the most convenient points for the collection and distribution of the products of both districts. The city has thus become an important commercial centre and also a manufacturing place of the first rank.

The bulk of the lake traffic consists of coal, coke, and iron. The receipts of coal and coke in 1913 by lake, rail, and canal amounted to 9,817,000 tons; and the shipments for the same year were 4,986,000 tons. The coal is distributed among the various lake ports farther west and north. The receipts of iron ore in 1913 were 8,783,000 tons; and the shipments for the same year were 6,141,000 tons. Grain and live stock ranked next in importance. Cleveland is the largest market for fresh-water fish in America.

The city has remarkable advantages for the accommodation of its shipping—two parallel piers, built out 1500 feet into the lake, form a channel 200 feet wide and 21 feet deep at the mouth of the Cuyahoga; and the many windings of the latter afford 18 miles of river frontage, over five miles of which are docked. A branch of the Cuyahoga flowing westward, not far from the lake and parallel with it, has been dredged so as to afford room for excellent shipyards and docks. In 1878 the United States government began a breakwater to inclose a harbor of refuge 360 acres in extent, with an opening of 500 feet, opposite the mouth of the river. Later plans and appropriations, however, provide for an opening of 700 feet and a breakwater 4 miles in length, inclosing a harbor of 800 acres. There are now nearly 6 miles of breakwater constructed at a cost of about $6,000,000. The harbor has been dredged to 25 feet. In the number of tons of freight received and shipped by vessel, Cleveland ranks second among the ports of the Great Lakes. Cleveland is on nine railways, some of which are the leading trunk lines of the country, including several of the Vanderbilt lines and the Pennsylvania system. It is also the centre of seven interurban railroads, which radiate to important towns and cities in northern Ohio.

Cleveland is now the largest manufacturing centre in Ohio and the second largest on the Great Lakes. During the decade 1900–10 the value of its product increased from $139,356,000 to $271,961,000, or 95 per cent. In 1910 there were employed in factories 84,728 wage earners. As above intimated, the most important group of manufactures consists of iron and steel, and the large number of industries which depend upon iron and steel as their raw material. According to the census of 1910, the iron and steel products were valued at $38,463,000, and the foundry and machine-shop products ranked a close second with a value of $37,443,000. The third industry in the city was the manufacture of automobiles, including bodies and trucks, the output of which was valued at $21,404,000, which represents an increase over 1904 of over 360 per cent, and forms 55.1 per cent of the value reported for the State for this industry. Other industries of importance, and the value of their products in 1909, are women's clothing, $12,789,000; printing and publishing, $9,635,000; paint and varnish, $6,138,000; and

men's clothing, $5,953,000. In the production of wire and wire nails Cleveland outranks all other American cities, and in hardware it takes second place. Bridges, electrical apparatus and supplies, printing presses and shipbuilding are also important. From an early date Cleveland led in the construction of wooden vessels for the lake traffic and, with the change from wood to iron, has continued in the lead, producing to-day more steel merchant vessels than any other American city. The chief industries which depend upon agricultural resources are slaughtering and meat packing, and the manufacture of malt liquors, the former exceeding a value of $17,192,000 in 1910, and the latter having a value of $5,124,000. The Standard Oil Company has here one of its principal refining establishments.

Government, Finance, and Municipal Enterprise. A charter, providing for the so-called "Federal Plan" of government, in which the distinction between executive and legislative functions was clearly drawn, was obtained from the State in 1891 and continued in force until supplanted by a municipal code enacted by the Ohio Legislature, Oct. 22, 1902. This code provided for the following biennially elective officials: a city council of 32 members, a mayor, a vice mayor (who acted as president of the council and had the deciding vote), three members of a board of public service, a solicitor, a treasurer, and an auditor. A board of public safety of two members was appointed by the mayor, subject to the approval of the city council. This code stood until 1910, when it was amended by the consolidation respectively of the boards of public service and safety into two officials, the directors of public service and safety, and, thus amended, continued in force until the first day of July, 1913, when the voters of Cleveland adopted a home-rule charter drafted by a commission of 15 citizens.

The provisions of this instrument make it one of the advanced municipal charters of the country. Party primaries are eliminated, and candidates for elective offices are nominated by petition only. No party emblems or designations appear on the ballot, and the preferential system of voting is used. There are only two elective offices, that of mayor and that of councilman, and the incumbents are subject to recall upon petitions signed by 15,000 electors in the case of the mayor and 600 electors in the case of a councilman. The council is made up of 26 members elected from wards for a term of two years, and its functions are limited strictly to legislation, the members being forbidden any part in administration. On the other hand, the mayor and heads of departments have seats in the council with the right to take part in discussions, but without the right to vote. The mayor is elected for a term of two years, his salary is fixed by the council, he is granted broad supervisory powers, and responsibility is definitely fixed on him for the proper administration of the affairs of the city. He is surrounded by six departmental directors, whom he appoints or dismisses at will. These are the directors of law (vice mayor), of public service, of public welfare, of public safety, of finance, and of public utilities. Departments are then subdivided into divisions, with commissioners appointed by the respective directors. Appropriate functions are assigned to these departments and divisions. Power is given to the council, with the concurrence of the board of control (the mayor and the directors), to create, discontinue, rearrange, or abolish departments and divisions, except that the department of public utilities may not be discontinued. This department has control of all municipal enterprises which derive no revenue from taxation, and its reports are required to be kept separate and distinct and to show clearly the results of municipal ownership. The department of finance is patterned after the best modern accounting systems, and a continuous audit by competent accountants, under direction of the council, is provided. Health, charities and corrections, recreation, and employment are gathered together in the department of public welfare, and their work correlated. A civil service commission of three members, appointed by the mayor for terms of six years, is provided, and the commission given authority to see that officers and employees are appointed on the basis of merit and fitness and promoted according to competency. Exclusive franchises are prohibited, and grants or renewals must reserve to the city the power to regulate the right to terminate the same, and the right of recaption. The commissioner of the division of franchises is charged with the enforcement of the provisions of all public-utility grants. A bureau of information and publicity is established, which has charge of all city printing, reports, statistics, the publication of a city record, and the collection of municipal information. Finally, the initiative and referendum are provided. A proposed ordinance may be placed before the council by an initiative petition signed by 5000 electors. If not passed by the council, it must be submitted to the voters at the next regular election, or an additional petition containing the signatures of 5000 additional electors will compel its submission to a vote of the people at a special election. A petition of 10 per cent of the total vote at the last municipal election will compel the submission of an ordinance to a referendum.

The total indebtedness, Jan. 1, 1913, was $39,471,886, for which a sinking fund provided $5,277,311. The net per capita debt was $70.48. The total tax rate was $13.60 per $1000, of which $4.87 was for school and library purposes, $5.78 for city and sinking fund purposes, $2.48 for county, and $0.45 for State purposes. The total actual income for 1912 was $17,505,522, of which the property tax was $3,993,057. The total expenditures for maintenance and operation were $7,496,874, and for construction and other capital outlays, $6,518,753. The assessed valuation for the year 1912 was $765,754,880.

The ample water supply is provided from several reservoirs and tunnels sunk into the lake, which run out from 1½ miles to 4 miles to five different cribs. A gigantic 10-foot tunnel is now in process of construction, as is a mechanical filtration plant, and together with sewage-disposal plants which are being built, will insure a permanent supply of pure water. There are 799 miles of water mains and 619 miles of sewers.

Cleveland has attained much distinction in recent years by its unique plan of regulating the street railways. By the terms of the settlement ordinance which went into operation March 1, 1910, the public gets transportation at cost, the city controls service and the upkeep of the property, and the company manages and operates the lines for a fixed return on an agreed

valuation. Cost of transportation includes legitimate operating expenses, maintenance, renewal, and depreciation charges, interest and taxes. There are 10 possible rates of fare, ranging from the maximum, four cents cash fare or seven tickets for 25 cents and one cent for a transfer, to the minimum, flat two cents cash fare. The prevailing rate of fare is determined by a barometer reserve called the Interest Fund, containing $500,000 in the beginning. When the fund goes over $700,000, the fare is lowered to the next lower rate; when it goes below $300,000 the fare is raised to the next higher rate. The initial rate of fare was three cents and one cent for transfer; this was lowered to flat three-cent fare on June 1, 1911. The city controls and specifies service through the city council and the latter's technical adviser, the street railroad commissioner. The company runs the road on fixed allowances for operation and maintenance, employs or discharges all officers, operatives, clerks, etc., expends revenues subject to the supervision of city authorities, and its stockholders receive a guaranteed and fixed return of 6 per cent. Differences between the company and the city which cannot be adjusted amicably are settled by arbitration. The city reserves the right either to purchase the property upon six months' notice, or, after Jan. 1, 1918, to designate a purchaser, the purchase price to be the ordinance value plus future additions. If the purchase is made before the expiration of the grant, a 10 per cent bonus is added to capital value less bonds and floating debt, which latter the city assumes. The company's franchise expires May 1, 1934. The city has the option of renewing it for a longer period upon the same terms as the original grant.

Population. Cleveland rose during the decade 1900–10 from seventh to sixth rank among the cities of the United States, and is the third largest city west of the Alleghanies and the second largest of the Great Lake cities. The following gives her population by decades: 1830, 1076; 1840, 6071; 1850, 17,034; 1860, 43,419; 1870, 92,829; 1880, 160,146; 1890, 261,353; 1900, 381,768; 1910, 560,663. Cleveland during the last decade increased nearly three times as fast as the State of Ohio as a whole. There are few negroes, but many foreigners, the foreign born in 1910 numbering 195,700, or more than one-third of the total. Among the foreign born the Germans are predominant, constituting in 1910 about 29 per cent. Bohemians and other Slavs come next with 18 per cent, and thereafter the Hungarians with 11 per cent, the Russians with 9 per cent, the Irish with 8 per cent, the English with 6 per cent, the Italians with 4 per cent, and the Canadians with less than 4 per cent. The native whites of foreign parents numbered 171,560, and with the foreign-born inhabitants made up 75 per cent of the city's population.

History. In 1795 the Connecticut Land Company bought from Connecticut a large part of that State's Western Reserve (q.v.), and in the following year sent out a party under Gen. Moses Cleaveland to survey their purchase. Cleaveland selected the mouth of the Cuyahoga as the site for a settlement, and in July, 1796, laid out on the east bank a village, which took his name, though the spelling was changed in 1831 to meet the exigencies of a newspaper editor's headlines. In 1800, by Act of Congress, the Western Reserve was included for administrative purposes in the Northwest Territory, and Trumbull County was erected to include the land about the mouth of the Cuyahoga. Of this, Cleveland, then having a population of about 57, became the county seat in 1809. In 1814, Trumbull County having previously been subdivided, the village of Cleaveland, in the county of Cuyahoga, was incorporated with a population of less than 100. In 1818 the first newspaper, *The Cleveland Gazette and Commercial Register*, began publication, and in 1827 the Ohio Canal, which five years later was completed to the Ohio, was opened between Cleveland and Akron, giving such an impetus to the former that her population increased tenfold (from 600 to 6000) between 1825 and 1835. In 1836 Cleveland was chartered as a city. In the early fifties it was first connected by rail with the East and with the other cities in Ohio, and from this period dates its rapid growth. In 1853 Ohio City, which had been founded in 1817, was united to Cleveland. During the Civil War a number of manufacturing establishments were set up, and in the interval 1861–65, owing to its ability to supply articles for which there was a great demand, Cleveland attracted many investors; its lake traffic was doubled, and its population increased 50 per cent. In 1872 it annexed East Cleveland, in 1873 Newburg, and in 1893 West Cleveland and Brooklyn. In 1905–06 Glenville and South Brooklyn were annexed, followed by Collinwood (1910), Nottingham and Newburgh City (1912), and a part of Euclid Village (1913).

Consult: Robison, *History of the City of Cleveland* (Cleveland, 1887); Avery, *Cleveland in a Nutshell* (ib., 1893); Kennedy, *History of Cleveland* (ib., 1896); Orth, *A History of Cleveland* (ib., 1910); Chamber of Commerce, *Annual Reports* (ib., 1865–1913); Johnson, *My Story* (New York, 1910).

CLEVELAND. A city and the county seat of Bradley Co., Tenn., 30 miles east by north of Chattanooga; on the Southern Railroad (Map: Tennessee, F 4). It is the seat of the Centenary Female College. The city is in an agricultural district with important peach-raising interests, and has woolen and flour mills, stove works, chair factory, hosiery mills, ice and cold-storage plant, lumber and planing mills, and a coffin factory. Settled about 1820, Cleveland was incorporated about 1880. The water works are owned by the city. Pop., 1900, 3858; 1910, 5549.

CLEVELAND, CHARLES DEXTER (1802–69). An American educator, born in Massachusetts. He graduated at Dartmouth in 1827 and was professor of Latin and Greek in Dickinson College and of Latin in the University of the City of New York. From 1861 to 1867 he was United States Consul at Cardiff, Wales. Among his books are his compendiums of *English Literature* (1847), *American Literature* (1858), and *Classical Literature* (1861); *English Literature in the Nineteenth Century* (1851); an edition of *Milton's Poetical Works*, with a *Life* (1851); *A Complete Concordance to the Poetical Works of John Milton* (1867).

CLEVELAND, FREDERICK ALBERT (1865–1914). An American economist, born in Sterling, Ill. He graduated at De Pauw University in 1890, then studied law, but in 1896 gave up practice to devote himself to economics, first at the University of Chicago and then at the University of Pennsylvania, where he was instructor in finance in 1900–03. He was professor

of finance in the New York University School of Commerce in 1903–05, and then served as an accountancy expert on many important commissions, notably that on New York City finances (1905), and President Taft's commission on economy and efficiency (1911), which recommended a national budget and many other simplifications of Federal business.* In 1907 he became director of the Bureau of Municipal Research (New York and Philadelphia). His more important books are: *Growth of Democracy in the United States* (1898); *Funds and Their Uses* (1902; revised for schools, 1903, as *First Lessons in Finance*); *The Bank and the Treasury* (1905); *Chapters on Municipal Administration and Accounting* (1909); *Organized Democracy: an Introduction to the Study of American Politics* (1913). With F. W. Powell he wrote *Railroad Promotion and Capitalization* (1908), and *Railroad Finance* (1912).

CLEVELAND (STEPHEN), GROVER (1837–1908). An American statesman who was the twenty-second and twenty-fourth President of the United States, and whose administrations signalize an epoch in American political history. He was born at Caldwell, N. J., on March 18, 1837, the son of a Presbyterian clergyman (Yale, 1824). The family moved from Caldwell to New York State, and it was in Fayetteville, near Syracuse, and in Clinton that young Cleveland received a somewhat elementary education. Upon the death of his father (1853) he became a teacher in the New York Institution for the Blind, but presently was induced by his uncle, Lewis F. Allen, to make his home in Buffalo, where he studied law and was in 1859 admitted to the bar. Four years later he became assistant district attorney for Erie County, but was defeated as a Democratic candidate for district attorney in 1865. In 1870 he was elected sheriff of the county—a position which he held for three years. He then resumed the practice of law and acquired a local reputation for firmness and integrity. While sheriff he had given a marked proof of a trait that was always characteristic of him, by hanging a condemned criminal with his own hands instead of deputing this unpleasant duty to a deputy. This was in accordance with Cleveland's own conception of the manner in which a public office should be conducted, as he held that officials should not delegate any of their important functions to others. In the same manner, when Governor of New York, he wrote most of his letters personally, instead of employing a secretary; and when President, he himself minutely examined even the most unimportant bill before signing it, leaving nothing to subordinates. At the time, however, and subsequently, his execution of the criminal was wrongly interpreted as evincing parsimony; and in 1884 his political opponents gave him the offensive nickname of "the Hangman of Buffalo." In November, 1881, however, he had so impressed his fellow citizens that men of all parties joined in electing him as mayor of Buffalo, in the belief that he would suppress the political and social corruption that was making that city notorious. Cleveland more than met the expectations of his followers and showed himself so unflinchingly courageous and so indifferent to all insidious influences as to work something like a municipal revolution. Although he incurred the hatred of many dishonest and disreputable combinations, his services were so notable as to win for him the Democratic nomination for the governorship of New York in 1882, his opponent being Judge Charles J. Folger (q.v.), then Secretary of the Treasury under President Arthur. Cleveland was elected by the extraordinary plurality of 192,854 votes —the size of this plurality, however, being due very largely to bitter dissensions in the Republican party, which had become divided into two factions, known respectively as the Half Breeds (q.v.) and the Stalwarts (q.v.).

As Governor of New York, Cleveland showed such good judgment and such independence as to make him a prominent candidate for the presidency. He cared nothing for popularity, but used the veto power so unsparingly as to offend alike the Catholic voters of Tammany Hall, the labor element, and a large number of citizens who took umbrage at his veto of a bill intended to compel the elevated railways to reduce their passenger rates. Nevertheless, Cleveland's perfect fearlessness won him a strong following throughout his party, and in 1884 the Democratic National Convention, held in July, gave him the necessary two-thirds of all its votes, so that he was selected on the second ballot. In the campaign which followed, Cleveland's opponent was the brilliant and magnetic James G. Blaine (q.v.). This campaign was immensely important as showing that the issues relating to the period of the Civil War and reconstruction had ceased to interest the younger generation of Americans, and that even the alarmist cry of "free trade" no longer terrified any but the most timid and unthinking. The contest, which began immediately after the nominations, was very long and very bitter, and was marked by a personal antagonism such as fortunately remains unique in the history of American politics. Blaine was attacked for alleged political and personal dishonesty. Cleveland had to face a charge based upon a single incident of his private life dating back a number of years and frankly dealt with. This episode is said to have inspired Paul Leicester Ford to write his remarkable political novel, *The Honorable Peter Stirling* (New York, 1886). On the day after the election in November the result was still in doubt, and victory was claimed by the Republicans; but within two days the official count showed that a very small plurality in New York State had given Cleveland a majority of 37 votes in the Electoral College. This result was largely due to the support of Cleveland by the independent Republican voters, popularly known as "Mugwumps" (q.v.), and of certain indiscretions on the part of Blaine near the close of the contest. The Democrats also won the national House of Representatives, though the Senate remained Republican by the small majority of six votes.

Cleveland assumed the presidency with the same independence of spirit that he had shown when mayor and governor. It was written of him at the time: "We have now as personal a government as we ever had under Grant." The President accepted the responsibility for every act of his administration. His cabinet officers, though men of great ability, were little more than his private secretaries. The Vice President, Mr. Hendricks, was almost studiously ignored. Cleveland, while many changes were made, refused to sweep all Republicans out of office without cause, and thereby incurred the enmity of the spoilsmen of his own party by enlarging the powers of the Federal Civil Ser-

vice Commission. He vigorously opposed the abuse of the pension system and thus became detested by the Grand Army of the Republic (q.v.) as a body. He declared himself in favor of a lower tariff and in so doing estranged the manufacturing interests. When the Senate demanded that he make public certain papers relating to removals from office of various officials, he laid down the constitutional doctrine of his predecessors that a President's papers were not subject to congressional supervision. Finally, in a message which he sent to Congress in 1885, he declared that the compulsory coinage of silver dollars as directed by the Bland-Allison Act would become a source of financial disturbance, and he recommended the repeal of that act. Other measures of his administration were marked by equal courage and vigor, such as the suppression of an insurrection on the Isthmus of Panama, which he occupied with 3000 United States marines and soldiers; the quashing of a threatened Mormon outbreak in Utah through the concentration of both infantry and artillery at Salt Lake City; and during a dispute over the Canadian fisheries, a threat to prohibit Canadian traffic from entering the United States by any except American railways. All of these measures made him new enemies, though they also intensified the admiration of his friends. His marriage with Miss Frances C. Folsom in 1885 was the second marriage of a President in his term. His hold upon his own party at large remained strong enough to secure his renomination at the National Democratic Convention held at St. Louis on June 7, 1888, and he was praised by many lifelong Republicans, among whom James Russell Lowell and Theodore Roosevelt were conspicuous. Although Congress had been partly Republican and partly Democratic, much valuable legislation had been enacted, among the principal measures being the creation of the Interstate Commerce Commission, the admission of four new States, the passage of an Anti-Polygamy Bill, of a Chinese Exclusion Act, of a Presidential Succession Bill, and of a bill limiting the powers of Congress in counting the electoral votes. A tariff measure, known as the Mills Bill, passed the Democratic House, but it was radically amended in the Republican Senate and never became a law. All this legislative activity showed that new issues were beginning to interest the country. At the presidential election of 1888 Cleveland was defeated by Gen. Benjamin Harrison (q.v.) of Indiana, who had 233 electoral votes against 168 for Cleveland. This result was largely due to a division in the Democratic party in New York State, which gave its electoral votes to General Harrison, while choosing a Democrat, David B. Hill, for Governor.

At the close of his first term, in 1889, Cleveland retired to New York City, where for four years he engaged in the practice of law. His political career was at first supposed to have been ended by his defeat; but with each year he gained a new popularity throughout the country until at last, against his own wishes, he became the most conspicuous candidate for the presidential nomination in 1892. Though defeated in 1888 in the Electoral College, he had, none the less, a majority of some 100,000 ballots in the popular vote; and the sentiment in his favor was now very strong. General Harrison was by no means popular, and he had antagonized Mr. Blaine. Furthermore, the McKinley tariff measure (see McKINLEY, WILLIAM) with its high duties was generally regarded as a mistake. Therefore, when the Democratic National Convention met at Chicago on June 21, an ardent supporter of Cleveland was made chairman and, before the convention met, many States had instructed their delegates to support the ex-President, so that he was sure on the first ballot of at least a majority. The delegates of his own State of New York, however, owing to Tammany Hall and the opposition of Senator Hill, were against him, and this was supposed by politicians to be fatal to his chances. But when the convention reached the stage of balloting, all opposition to Cleveland was overcome. The session lasted until long after midnight. A display of fervid eloquence by Mr. Bourke Cockran on behalf of Tammany Hall merely put the delegates into a still more aggressive mood; and in the early hours of the morning the first roll call showed at once that Cleveland had secured even more than the two-thirds vote necessary to give him the nomination. The scene was one of indescribable enthusiasm, as Cleveland had broken all precedents; and, though his enemies had spoken of him as the "Stuffed Prophet" and the "Perpetual Candidate," he had been selected against his own desires, against the opposition of his own State, and through a perfectly spontaneous uprising of the people. In the very dignified campaign which followed, President Harrison had no chance of being reëlected, and in the November election Cleveland swept the country. Not merely did he carry all the Southern States, but likewise the four "doubtful States"—Connecticut, Indiana, New Jersey, and New York—and, to the surprise of all political prophets, California, Illinois, and Wisconsin solidly, while he also received some electoral votes from Michigan and Ohio. In the Electoral College he had 277 votes as against 145 that were cast for President Harrison. For the first time since the birth of the Republican party, a third candidate, Gen. James B. Weaver (q.v.) of Iowa, had also received electoral votes and to the number of 22, and in the popular vote no less than a million votes had been cast for him by the Populists. (See POPULIST PARTY.) This was ominous for the future; but in 1893 Cleveland resumed the presidency bound by no personal pledges, and free to carry out whatever policies he might choose, since both the Senate and the House were controlled by a majority of his own party.

His second administration proved to be one of the most remarkable in the history of American politics. Cleveland's personality was a determining factor in whatever he achieved and in whatever he failed to carry out. His independence had naturally developed into something like arrogance. His natural tactlessness had grown into an utter lack of consideration for the weakness and prejudice of other men. On the other hand, his robust courage had grown still more indomitable, and it stood him in good stead, despite all the virulence and hatred which his subsequent course engendered. No President ever did more unpopular things. No President ever estranged in different ways so many of his countrymen at various times. Yet it must be added that no President showed such utter fearlessness or so determined a purpose to carry out unflinchingly and uncompromisingly what he believed to be his duty. Almost his first act was

unpopular in reversing the policy of President Harrison towards the annexation of Hawaii and in endeavoring to replace upon the Hawaiian throne a queen who had been dethroned by a revolution led by men of American blood. (See HAWAII.) In this he failed, though he went to the very verge of using force against the new government of Hawaii. Coincident with this fiasco came a great money panic, based upon the evils springing from the Silver Coinage Act of 1890 for which both parties voted and supported in their party platforms. (Consult Laughlin, *The History of Bimetallism in the United States*, published at New York in 1897.) After a long and bitter contest in Congress, the Silver Act of 1890 was repealed, but not until President Cleveland had boldly used the whole power of his office and of its patronage to secure the repeal. In fact, in the Senate, his own party was seriously divided, and he carried his measure only by the assistance of Republicans. In the teeth of the opposition which he had aroused, Cleveland set himself energetically to reform the tariff. The so-called Wilson Bill (see WILSON, W. L.) looking to that end was introduced confessedly as an administration measure. It sought to lower the tariff duties on many necessities of life, especially upon wool and sugar. Here, again, Cleveland encountered the opposition of a large section of his own party, and when the bill was finally passed, after a great deal of scandal affecting the reputation of Democratic senators, it had been so emasculated that the President allowed it to become law without his signature, causing a personal letter of his to be read in Congress, that contained a denunciation of those Democrats whom he declared to be guilty of "party perfidy and party dishonor." A third measure of Cleveland's was the issuing of bonds in order to retain intact the gold reserve in the treasury and to secure the parity of gold and silver under existing legislation. These bond issues were first effected through a great banking syndicate, which made a profit of nearly 16 per cent upon its purchases of bonds; and now the President incurred the violent hostility of the whole West, which had become strongly Populistic. He himself was obliged to yield to the indignation which was everywhere expressed, and the last issue was by popular subscription, which proved a great success and stopped the drain of gold from the treasury. An income tax was enacted into law, but was declared by the Supreme Court to be unconstitutional. In 1894 a great railway strike, centring in Chicago, was crushed when President Cleveland ordered United States troops to enter the metropolis of the West "to prevent the obstruction of the mails," even though the Democratic Governor Altgeld of Illinois protested vehemently and had his protest rudely brushed aside by the President. Much acrimony was caused by the use of injunctions obtained from the United States courts against the strikers; and even in the East and among the most conservative, "government by injunction" was everywhere denounced. (See DEBS, EUGENE V.) But the most lasting mark upon American history made by Cleveland is to be found in his extension of the Monroe Doctrine (q.v.) by his Venezuelan Message, sent to Congress on Dec. 17, 1895. Great Britain had for a long time been encroaching on the territory of Venezuela (q.v.) and had refused to arbitrate the subject or to delimit the boundaries of British Guiana and Venezuela. Cleveland and his Secretary of State, Richard B. Olney, had taken up the subject and had urged the British government to submit the whole question to arbitration. Lord Salisbury replied in two notes which denied the right of the United States to intervene in such a question, and these notes were couched in terms of sneering civility. Immediately upon their receipt in Washington President Cleveland sent a terse, dignified, and haughty message to Congress, setting forth the merits of the question and declaring that it was "the duty of the United States to resist by every means in its power" a willful aggression upon its rights and interests by Great Britain in Venezuela. A single sentence showed that he was prepared to carry out this policy by war if necessary. His pregnant words produced a profound impression throughout the whole world. Great Britain was thrown into something like a panic, and so were the money markets of the United States; but both parties in Congress supported the President, and in the end the British government capitulated and accepted the arbitration which it had hitherto refused. The inflexible courage of the President, following a precedent set by Daniel Webster (q.v.) in his famous Hülsemann Letter, raised the United States to the position of a great world power, enhancing its prestige in spite of the academic criticism which came to him from American closet politicians. Dr. Edward Stanwood, a Republican, an intimate friend of Blaine, and a close student of American politics, summed up the Venezuelan episode as "the most signal victory of American diplomacy in modern times."

This was the last and most striking feature of Cleveland's public career. When he went out of office in 1896 he did so under a black cloud of disapproval almost unique in the history of politics. He was hated in the West because of his attitude towards silver. The labor element was violently antagonistic to him because he had crushed the Chicago strike. His Venezuelan Message, by causing a panic in Wall Street, had lost him the sympathy of the great financiers. His private life had been bitterly though unjustly assailed. Every corrupt element in national politics was against him. At the Democratic National Convention in 1896, contrary to all precedents, a resolution mildly commending his course as President was hooted down with jeers and curses. Even one of his strongest supporters could find little more to say of him than that he had been "successful in his failures." Yet it was Cleveland's good fortune to outlive this obloquy. The Republicans who succeeded him adopted and perfected his policies. The whole country came to appreciate the services which he had rendered by his indomitable courage. His mistakes were condoned, and his successes were universally praised. He had, indeed, saved the United States from practical repudiation; he had enforced order with a strong hand; and he had raised the nation to a foremost rank among the great powers of the world. During the campaign of 1904 his name was tremendously applauded at the national conventions of both parties.

After retiring from the presidency Cleveland made his home at Princeton, N. J., becoming a trustee of the University there and an occasional lecturer in it. The substance of his lectures will be found in a book which he wrote, entitled *Presidential Problems* (New York,

1904). In 1895 he was appointed a trustee of the majority stock of the Equitable Life Assurance Society, at the instance of Thomas F. Ryan, a position which he retained until his death, in 1908. It is somewhat characteristic of his career that at least one member of the committee which arranged a great memorial meeting in New York in Cleveland's honor should have been during the latter's public life a bitter assailant of him and a propagator of the vilest stories concerning him.

As a public speaker, Cleveland was always sensible, though somewhat ponderous in manner. He had a clear tenor voice which was easily heard at the very outskirts of immense audiences. His public papers show much felicity of diction, pungent and sometimes tipped with an acid wit, as may be seen in reading over his numerous vetoes of private pension bills. His Venezuelan Message was characterized, even in England, as "full of stateliness and force." As a phrase maker he is comparable with General Grant, and some of his sayings, such as a "public office is a public trust," "ghoulish glee," "pernicious activity," and "the communism of pelf," were widely quoted and still remain a part of the politicians' vocabulary.

Bibliography. For the facts of Cleveland's public life, consult: Hensel and Parker, *The Life and Public Services of Grover Cleveland* (New York, 1906); Gilder, *Grover Cleveland* (ib., 1910); Parker, *Recollections of Grover Cleveland* (ib., 1909). A caustic criticism of Cleveland, put forth under the pseudonym of "Siva," was published in 1885 under the title of *A Man of Destiny*. Comments upon Cleveland's extension of the Monroe Doctrine (favorable) will be found in Foster, *A Century of American Diplomacy* (ib., 1900); Stanwood, *A History of the Presidency* (Boston, 1898); Henderson, *American Diplomatic Questions* (New York, 1901); McClure, *Our Presidents* (3d ed., ib., 1905); and (unfavorable) by J. W. Burgess and J. B. Moore in *The Political Science Quarterly* for March, 1896. Consult also Reynolds, *National Platforms and Political History* (Chicago, 1898); H. T. Peck, *Twenty Years of the Republic*, chaps. i, ii, iv, vi, x, last reprint (New York, 1913); and id., *American Party Leaders* (ib., 1914). For an English view of Cleveland, especially with reference to the Venezuelan affair, consult Whittle, *President Cleveland* (London, 1896), and Gretton, *A Modern History of the English People*, vol. i (London and Boston, 1913).

CLEVELAND (or **CLEIVELAND**), JOHN (1613–58). An English Cavalier poet. He was born at Loughborough, Leicester, and educated at Cambridge, where in 1634 he became a fellow of St. John's. Six years later he strenuously opposed Cromwell, and in consequence lost his fellowship in 1645. Joining the Royalists, he was appointed judge advocate in the King's army. In 1655 he was seized at Norwich and imprisoned at Yarmouth for three months, when he was released by Cromwell. After that he lived in retirement. Cleveland had a great reputation as a wit and satirist. A volume of his poems in circulation before 1656 was reissued in that year. In 1687 appeared his collection entitled *Clevelandi Vindiciæ*, which attempts to combine several of his preceding publications. The bibliography of Cleveland is too complicated for treatment here. Cleveland still awaits a competent editor. Thomas Fuller describes him as "a general artist, pure Latinist, exquisite orator, and eminent poet." Consult *Cambridge History of English Literature*, vol. vii (New York and London, 1907–13), and *The Poems of John Cleveland*, ed. J. Burdan (New York, n. d., but about 1910).

CLE'VENGER, SHOBAL VAIL (1812–43). An American sculptor, born at Middletown, Ohio. He first became known through his work as a stone carver in the workshop of David Guion in Cincinnati, and afterward under the patronage of Nicholas Longworth visited the large cities of the East, where he executed busts of Clay (Metropolitan Museum, New York), Webster, Van Buren, Allston (Pennsylvania Academy), Everett, and others. His portrait bust of Webster has been used on a United States postage stamp and is considered the best likeness of that statesman. In 1840 he went to Rome, and while there he produced his "North American Indian," which cannot at present be located, but was hailed in his day as the "first distinctively American sculpture." His work is characterized by sincere, bold treatment and skill in handling his material. But for his early death, which occurred while he was on his way home, he would probably have attained a high rank in his profession. Consult Lorado Taft, *History of American Sculpture* (New York, 1903).

CLEVES, klēvz (Dutch *Kleefs*, Ger. *Kleve*, Fr. *Clèves*). A German town of Dutch origin, situated in the Rhine Province of Prussia, 23 miles northwest of Wesel and about 5 miles from the frontier of the Netherlands (Map: Prussia, B 3). It is built on three hills and has still retained some of its Dutch characteristics. It contains an old palace, the former abode of the dukes of Cleves, now used as a law court; the tower known as Swan Tower is used as a prison. Commemorating the Knight of the Swan made famous by Wagner's opera, a monument has been erected. An old Rathaus, with a number of antiquities and paintings, and an old Catholic church, built in Gothic style and containing the tombs of the counts of Cleves, still remain. In the vicinity of the town are situated chalybeate springs. Cleves is frequented as a summer resort by the Dutch. The chief manufactures are paper, paint, hats, linen, cotton, tobacco, boots, shoes, and machinery. Pop., 1900, 14,684; 1905, 16,433; 1910, 18,135. The Duchy of Cleves, which arose in the Middle Ages and which at the time of the Reformation was united with the duchies of Jülich and Berg, passed in 1666 into the possession of Brandenburg. It was wrested from Prussia in the course of the Napoleonic wars, but restored in 1815.

Bibliography. Char, *Geschichte des Herzogtums Kleve* (Cleves, 1845); Nelsen, *Die Stadt Kleve* (ib., 1846); R. Scholten, *Die Stadt Kleve* (ib., 1879–81).

CLEW. See SAIL.

CLEWS, HENRY (1836–). An American banker, born in Staffordshire, England. He entered mercantile pursuits in New York City in 1845, became a member of various firms, was United States financial agent during the Civil War, and in 1877 organized the firm of Henry Clews & Co. He was a founder of the Union League Club, New York City, and also originated the Committee of Seventy in New York and nominated 65 of its members. He published: *Twenty-eight Years in Wall Street* (1887); *The Wall Street Point of View* (1900);

Fifty Years in Wall Street (1908); *Speeches and Essays* (1910).

CLICHÉ, klē'shā' (Fr., stereotyped). An electrotype plate, the impression of a die in a mass of fusible metal. It is employed by medalists and die sinkers to make proofs of their work and in order to judge the stage of their work before the die is hardened. The term is also applied to any stereotype plate used in modern reproductive processes, such as photographic proofs on glass, either positives or negatives.

CLICHY, or CLICHY-LA-GARENNE, klē'shē'lä-gà'rĕn'. A northwestern suburb of Paris, France, between the river Seine and the fortifications of Paris (Map: Paris). Pop., 1901, 39,291; 1911, 46,676.

CLICK BEETLE. A beetle of the family Elateridæ, also known as elater, snapping bug, and skipjack, on account of its acrobatic performances. When disturbed, these beetles curl up their legs and fall to the ground, where they lie rigid on their backs for some moments and then begin a series of springs into the air, accompanied by a clicking sound. When the beetle succeeds in landing on its feet, it runs off. In regard to the springing, Le Conte says: "This is effected by extending the prothorax so as to bring the prosternal spine to the anterior part of the mesosternal cavity; then, suddenly relaxing the muscles, so that the spine descends violently into the cavity, the force given by this sudden movement causes the base of the elytra to strike the supporting surface, and by their elasticity the whole body is propelled upward." The larvæ, known as wireworms, are hard, brownish yellow, and may live several years before gaining maturity. Most of them are found under bark and in rotten wood, but some live on the ground on the roots of grass, Indian corn, and other grains, as well as on those of certain vegetables. When numerous enough, they may do considerable damage. Fall plowing is said to be the most effective remedy against them. Of the 7000 described species of elaters 500 occur in North America. The most conspicuous click beetle found in the United States is the eyed elater (*Alaus oculatus*), a grayish-black beetle with two large black eyelike spots on the prothorax; its larvæ live in rotting stumps. In the tropics of America there are luminous species belonging to the genus *Pyrophorus*, as the cucuyo (*Pyrophorus noctilucus*) and others. For illustration, see ELATERIDÆ.

Bibliography. De Candeze, *Monographie des élaterides* (4 vols. and 3 supplements, Liège, 1857–81); Le Conte, "Revision of the Elateridæ of the United States," in *Transactions of Philosophical Society*, vol. x (Philadelphia, 1853); Horn, papers in *Transactions of American Entomological Society*, vols. xii, xiii, xviii (Philadelphia, 1885, 1886, 1891). See FIREFLY.

CLI'DOMAN'CY. See SUPERSTITION.

CLI'ENT (Lat. *cliens, cluens*, hearer, from *cluere*, Gk. κλύειν, *klyein*, Skt. *śru*, to hear; connected remotely with AS. *hlūd*, Eng. *loud*). In law, one who consults or retains an attorney or counselor at law for advice, or to prosecute, manage, or defend an action at law, or to represent him in any legal proceedings or in the adjustment of business troubles. The client's relations with his attorney are in the highest degree confidential, and the client is protected by the most stringent rules of law against the disclosure of his private affairs by his legal adviser. (See ATTORNEY; PRIVILEGED COMMUNICATION.) In the civil and political life of ancient Rome the term "client" was employed to describe the persons who stood in a relation of quasi-dependence to men of position and influence, usually patricians, who in their relation to their clients were known as patrons. The relation was not unlike that which in the United States frequently subsists between local political leaders and their supporters ("henchmen"), and the reciprocal rights and obligations of patron and client were defined by custom rather than by rules of law. Among these were the duty of the patron to advise and protect his clients in their legal and political rights, in return for which he was entitled to their support in any legal or political contest in which he became engaged.

CLIEN'TES. In ancient Rome, the inhabitants who had given up or had lost citizenship in their own cities and had settled in Rome or on Roman territory. See, under ROME, *History of Rome during the Earliest or Regal Period.*

CLIFF (AS. *clif*, Icel., OS., Dutch *klif*, from Icel. *klifa*, ME. *cliven*, to climb). A precipitous slope of the land surface. Cliffs may be formed in three ways: (1) by the erosive action of water; (2) by the disintegrating influence of rain, frosts, and the atmosphere, or weathering; (3) by dislocations of the earth's crust. On rocky coasts cliffs are carved out by the force of waves, which beat against the shore line, and by weathering of the rock that lies above the reach of the waves. The cliffs of Dover and of the Orkney and Shetland islands are notable examples of sea cliffs. Gorges, cañons, and ravines, which are characterized by steep walls, are excavated by the erosion of running water; they are usually found along the upper courses of rivers. Cliffs may mark the line of outcrop of stratified rocks, and in such cases are usually to be traced to differential weathering of hard and soft strata. In regions of disturbance cliffs are formed by faulting, which exposes a vertical rock face or scarp. Many of the notable elevations in the Adirondack Mountains in New York are characterized by faulted scarps. See SHORE; CAÑON; FAULT; ETC.

CLIFF DWELLER. A name frequently used to designate the supposed extinct builders of the numerous ancient cliff ruins scattered throughout the cañons and mesas of the arid Southwest, along the upper waters of the Colorado and Rio Grande—in Utah, Colorado, Arizona, and New Mexico. The ruins are either upon the summits of the mesas or on shelves in the rock walls of the cañons. For a long time their origin was a subject of much speculation; but recent ethnological investigation has proved that these ruins are not the work of any extinct or distinct race, but were built by the immediate ancestors of the modern Pueblo Indians (q.v.), some of whom, in fact, notably the Hopi, still have their villages upon the summits of almost inaccessible mesas, where they formerly located them for better protection against the wilder Navajo and Apache, by whom they were surrounded. Consult G. Nordenskiöld, *The Cliff Dwellers of the Mesa Verde, Southwestern Colorado* (New York, 1902), and numerous articles in the Annual Reports of the Bureau of American Ethnology. See ARCHÆOLOGY, AMERICAN.

CLIF'FORD, GEORGE, EARL OF CUMBERLAND (1558–1605). An English naval commander and buccaneer, born in Westmoreland. He succeeded

to the earldom in 1570, took the degree of M.A. at Cambridge in 1576, and in 1588 commanded the *Elizabeth Bonaventure* in the actions against the Spanish Armada. He fitted out and led several buccaneering expeditions; the most important were one undertaken with seven sail, in 1589, which captured several rich prizes, and one with 20 sail, in 1598, which took San Juan de Puerto Rico, but failed in an attempt to intercept the Spanish treasure galleons.

CLIFFORD, HARRY ELLSWORTH (1866–). An American electrical engineer, born at Lowell, Mass. He was educated at the Massachusetts Institute of Technology and at Harvard University. At the former institution he was assistant in physics (1886–88), instructor in theoretical physics (1888–95), assistant professor of theoretical physics (1895–1902), associate professor of theoretical electricity (1902–04), and professor of theoretical and applied electricity (1904–09). At Harvard he became professor of electrical engineering in 1909.

CLIFFORD, SIR HUGH [CHARLES] (1866–). A British colonial administrator, born in London. In 1883 he entered the Malay States Civil Service, and from 1887 to 1903 in one capacity or another was a representative of the English government at Pahang, taking a prominent part in the suppression of the rebellion of 1892. In 1903 he left the post of British Resident in Pahang, which he had held, with few breaks, since 1890, to become Secretary of Trinidad and Tobago; and he was Colonial Secretary of Ceylon from 1907 until August, 1912, when he was appointed Governor and Commander in Chief of the Gold Coast. Besides contributions to *Blackwood's,* he published important works on the Malays, including *In Court and Kampong* (1897), *Studies in Brown Humanity* (1898), *In a Corner of Asia* (1899), *Bush-Whacking* (1901), *Further India* (1904), *Downfall of the Gods* (1911), and *Malayan Monochromes* (1913). With Sir Frank Swettenham he began in 1894, at Perak, the publication of a *Dictionary of the Malay Language.* He wrote on the Malay states in the *Journal of the Royal Geographical Society* (1896) and in the *Journal of the Royal Colonial Institute* (especially vol. XXX). In 1910 he married as his second wife the novelist Mrs. Henry de la Pasture.

CLIFFORD, LUCY LANE (Mrs. William Kingdon). An English novelist. She was the daughter of John Lane of Barbados, and in 1875 married William Kingdon Clifford, the distinguished mathematician. Mrs. Clifford is best known by *Love Letters of a Worldly Woman* (1891) and *Aunt Anne* (1892). Among her other books are: *Any How Stories* (1882; reissued with additions, 1899); *Mrs. Keith's Crime* (1885); *The Last Touches* (1893); *A Wild Proxy* (1894); *A Flash of Summer* (1895); *Mere Stories* (1896); *The Dominant Note and Other Stories* (1897); *Margaret Vincent* (1902); and *Sir George's Objection* (1911). She also produced several plays, three of which were collected under the title *Three Plays* (1909), and the most notable of which was *The Likeness of the Night* (1900).

CLIFFORD, NATHAN (1803–81). An American jurist, born in Rumney, N. H. He graduated at the Hampton Literary Institution, was admitted to the bar, and commenced practice in York Co., Me., in 1827. He was a member of the State Legislature from 1830 to 1834, was Speaker of the House for the last two years, and was Attorney-General from 1834 until 1838. He served in Congress from 1839 to 1843, and in 1846 was Attorney-General in President Polk's cabinet. At the close of the Mexican War he went as a special United States envoy to Mexico and negotiated a treaty by which California and other territories became a part of the United States. In 1858 he became, by President Buchanan's appointment, an associate justice of the United States Supreme Court and in 1877 was president of the Electoral Commission (q.v.) that decided the Hayes-Tilden presidential controversy. He published *United States Circuit Court Reports* (2 vols., 1869).

CLIFFORD, PAUL. The hero of Bulwer's novel of the same name, a highwayman who is finally reformed through love.

CLIFFORD, WILLIAM KINGDON (1845–79). An English mathematician and physicist, born at Exeter. He was educated at a school in his native town, at King's College, London, and at Trinity College, Cambridge, where he was second wrangler in the mathematical tripos of 1867. In August, 1871, he was elected to the chair of mathematics and mechanics at University College, London, which post he retained until his untimely death at Madeira, March 3, 1879. Clifford first established his reputation as an original thinker in the realm of higher mathematics and philosophy, with the faculty of expressing scientific thought in plain and simple language by a lecture at the Royal Institution, *On Some of the Conditions of Mental Development.* He was a valued member of the London Mathematical Society, contributing to the *Proceedings;* for a time he acted as secretary, and afterward vice president, of the mathematical and physical section of the British Association; he also lectured to the Sunday Lecture Society on such subjects as *Ether, Atoms,* and *The Sun's Place in the Universe,* and took an active interest in popularizing science. The versatility of his mind in philosophical and scientific discussion was further shown by his varied contributions to periodical literature. Besides these articles, and many papers on mathematics, he issued the first part of a larger textbook, *Elements of Dynamics* (1878). Consult Clifford's *Lectures and Essays,* ed. by Leslie Stephen and F. Pollock (London, 1879), which contains a biographical sketch by the latter editor. After his death his *Mathematical Papers,* ed. by R. Tucker and with an introduction by Henry J. S. Smith, were published (1882), as was also *The Common Sense of the Exact Sciences,* which was completed by Karl Pearson and published in 1885.

CLIFFORD'S INN. An inn of Chancery, attached to the Inner Temple, in London, built in 1345, and named after Robert de Clifford, who lived in Edward II's reign. Like the other inns of Chancery, it is now used for office and business purposes.

CLIFF PALACE. A noted ruin in Walnut Cañon, Mesa Verde, Colo., a good example of the buildings of the cliff dwellers (q.v.).

CLIFF PLANTS. A group of drought plants, xerophytes (q.v.), found chiefly on river, lake, or sea cliffs. See ROCK PLANTS.

CLIFFSIDE PARK. A borough in Bergen Co., N. J., opposite New York City, with which it has connection by trolley and ferry. It is purely residential. Pop., 1900, 968; 1910, 3395.

CLIFF SWALLOW, or EAVES SWALLOW. A swallow (*Petrochelidon lunifrons*) familiar throughout North America as one of those that make their nests about barns and outhouses. (See BARN SWALLOW.) It is distinguished from other semidomestic swallows by its short, *square* tail, reddish rump, grayish breast and collar, and white forehead; and by the fact that it places its flask-shaped nests of mud always on the *outside* of the building, unlike the fork-tailed true barn swallows, which go inside the building to nest. These swallows originally nested in colonies wherever a rocky cliff afforded a chance to fasten their nests in close companies upon its face. (See Plate of FAMILIAR SWALLOWS, with the article SWALLOW.) These nests were globular, with a spoutlike neck, forming the entrance, and were formed of pellets of mud and lined with grass and feathers. As soon as human settlements began near their resorts, they abandoned the cliffs for the more secure, better-sheltered place under the eaves of such buildings as they were permitted to occupy; and as the spread of civilization has finally covered most of the range of the species, only a few places in the remote West remain where these birds may be seen nesting after their primitive habit. In the eastern part of the country interesting modifications of habit have followed their long-continued association with man—among others, a disposition to make a much simpler style of nest, leaving off the domed roof and flasklike entrance, and forming little more than a cup in its place, since the overhanging eaves keep off the rain and conceal the sitting bird. This genus is almost cosmopolitan, has similar habits nearly everywhere, and in all countries attaches itself to and is welcomed by civilization. Consult Knowlton, *Birds of the World* (New York, 1909).

CLIF'TON. A beautiful and favorite watering place in the southwest of Gloucestershire, England, forming the western suburb and part of the parliamentary borough of Bristol (Map: England, D 5). It has a tepid spring of 73° F., which contains carbonic acid and salts of magnesia. It has a college with 700 students. Earthworks date from the beginning of the city. The deep valley of the Avon is here spanned by a suspension bridge 245 feet above the water. Pop., 1911, 15,968. See BRISTOL.

CLIFTON. A city and the county seat of Graham Co., Ariz., 121 miles (direct) north by east of Bisbee, on the Arizona and New Mexico, the Morenci Southern, and the Shannon Arizona railroads, and on the San Francisco River (Map: Arizona, F 4). The chief industries are copper mining and stock raising. There are division offices of the Arizona and New Mexico Railway. Pop., 1910, 4874.

CLIFTON, or SUSPENSION BRIDGE. Former name of the town of Niagara Falls (q.v.), Ontario, Canada.

CLIFTON FORGE. An independent city of Virginia, 192 miles west by north of Richmond, on the Chesapeake and Ohio Railroad (Map: Virginia, E 4). It contains a railway hospital, and there are extensive railway shops, foundry and machine works, flouring and planing mills, and an ice-cream factory. Iron ore and limestone abound in the vicinity. The water works are owned by the city. Pop., 1910, 5748.

CLIFTON HEIGHTS. A borough in Delaware Co., Pa., 6 miles southwest of Philadelphia, on the Philadelphia, Baltimore, and Washington Railroad, and on Darby River (Map: Pennsylvania, L 8). It has manufactories of woolen and cotton goods, hosiery, and towels. The borough contains a public library. Pop., 1900, 2330; 1910, 3155.

CLIFTON SPRINGS. A village in Ontario Co., N. Y., about 28 miles (direct) southeast of Rochester, on the Lehigh Valley and the New York Central and Hudson River railroads (Map: New York, C 5). It is well known for its sulphur springs and contains the Clifton Springs Sanitarium, the latter surrounded by three parks. There are manufactories of pumps, insect sprayers, automobiles, bicycles, and tinware. Settled about 1850, Clifton Springs was incorporated as a village in 1859. The water works and electric-light plant are owned by the municipality. Pop., 1900, 1617; 1910, 1600.

CLIM, klĭm, or **CLYM OF THE CLOUGH,** klŭf (Clim of the valley, Icel. *kloft*, ravine, from *klūfa*, to split, AS. *clēofan*, to cleave). An English archer, said to have lived one generation previous to Robin Hood. He is known through the old ballad *Adam Bell, Clym of the Clought, and Wyllyam of Cloudeslee.* The ballad is far older than the oldest copy extant, printed by Copeland about 1550. A fragment of an older one exists, recovered by Payne Collier. In this ballad William of Cloudeslee shoots an apple from his son's head after the manner of William Tell of the continental legend.

CLIMAC'TERIC YEAR (Lat. *climactericus*, Gk. *κλιμακτηρικός, klimaktērikos*, climacteric, from *κλιμάκτηρ, klimaktēr*, round of a ladder, dangerous point in life, from *κλίμαξ, klimax*, ladder, staircase). The year in the life of a woman during which she undergoes what is commonly called the "change of life," and which generally falls between her forty-fifth and fiftieth years. Cessation of menstruation (the menopause) takes place, and there are vague nervous disturbances, or indigestion, hot flushes, etc. As a matter of fact, the menopause may extend over a period of two or more years. Many entirely unrelated symptoms are ascribed to it, as in the case of children during dentition. The headaches, e.g., may be due to presbyopia (see SIGHT, DEFECTS OF), which sets in at about the same time and which may be relieved by eyeglasses. The term "climacteric years" was once applied also to certain years in man's life, which were long believed by the disciples of astrology to have been the critical points of his health and fortune. Crises of this kind were, viz., supposed to be reached in the twenty-first, the thirty-fifth, the forty-ninth, and the sixty-third years of man's life. The most important of all was the sixty-third year, which was called, by way of eminence, *the* climacteric year, or the "grand climacteric." This year was supposed to be fatal to most men, owing to the fact that 63 is the product of the two mystical numbers seven and nine.

CLI'MATE (OF. *climat*, from Lat. *clima*, Gk. *κλίμα, klima*, region, slope, from *κλίνειν, klinein*, to incline). In its broadest sense climate is the sum total or aggregate characteristics of a given geographic locality with respect to atmospheric conditions, such as temperature, rainfall, wind, etc., that prevail. Thus we may conceive of the climate of the sun, for

example. In a more restricted and usual significance the word is used in meteorology to indicate the summation or general result of all the solar and terrestrial influences that affect animal or vegetable life. It is possible, in fact, to disregard the relation to life and consider only the meteorological phenomena as such, or the phenomena that affect any phase of our activity. Thus, one may ask, How does the climate favor navigation by sailing vessels, or the use of the wind as a motive power? In one region the climate may favor the development of a certain disease; in another it may favor the development of special varieties of plants or animals. The specific features that favor the growth of either plants or animals, enabling them to make a specific spot their home, are oftentimes so obscure as to elude our observation and record; therefore climatology is, in many respects, still an unsatisfactory study; but it has made such progress in the past 50 years as to have become exceedingly important to many classes of industries, as well as to physicians, naturalists, and agriculturists. Some varieties of plants are so dependent upon the nature of the soil in which they grow that Dr. Milton Whitney, of the United States Department of Agriculture, has advocated defining climatology as that which concerns the soil around the roots of the plant; but this is too narrow a view of the subject.

According to the usage of classic Greek, climate concerned principally the temperature of a place as regulated by the altitude of the sun at midday. As this varies with latitude, the ancients divided the known globe into zones two degrees broad in latitude, each of which was supposed to have its climate. At the present time, by combining the accumulated work of thousands of observers, we divide the globe into irregular regions, each of which differs from its neighbor in some important climatic condition as to temperature, rainfall, pressure, moisture, or the inclination of the sun and the amount of cloudiness. In the extensive works of the most eminent writers on climatology, especially those of Dr. Julius Hann, of Vienna, a large number of meteorological items are enumerated as being essential to a complete study of the climate of any place. These items include not merely the mean temperature, rainfall, cloudiness, the barometric pressure and relative humidity, but also the variations of these quantities, viz., their highest and lowest values each day, or month, or year, and the liability to sudden rises or falls. For navigation and the use of windmills, we need to know the average velocity of the wind, and perhaps especially the number of hours during which the wind exceeds a specified limit. With reference to the growth or importation of tender plants, the agriculturist needs to know the mean dates of the last frost of spring and the first frost of the autumn, the difference between which is ordinarily called the growing season. Since the establishment of the fact that the germination of seed, the growth of the plant, and the ripening of the harvest require a certain amount of heat or molecular energy, efforts have been made to determine the thermal constants for many plants and for each phase in growth. This "thermal constant" is usually expressed as the sum total of the average daily temperatures when such temperatures are above 42° F. There is also a "rainfall constant" peculiar to each species of plant, the nature of which has been investigated by Linsser, who has shown that plants are able by gradual evolution to change their own thermal and aqueous constants and eventually adapt themselves to a change in climate. Linsser's laws serve as a guide to those who would transplant a species from one part of the world to another of different climate.

In the study of climate with reference to navigation, we have to consider the frequency of destructive storm winds. Charts showing this factor have been published for all the oceans and seas by the hydrographic offices of England, France, Holland, Russia, and the United States. In addition to this, for the special benefit of sailing vessels, Galton has shown how to prepare charts showing, for each square degree, the progress that a vessel of a certain size and rig would make if her sails were set so that she should go in a certain direction. From the point of view of insurance, both life insurance and fire insurance, the destruction by wind, hail, and lightning has been studied; these data, being plotted on charts, show the climate of the country from that point of view. Perhaps the most general idea of the distribution of climate is given by charts which show the frequency per month or year with which storm centres pass over a given locality, and the direction in which they pass. A map of such frequency for the eastern portion of the United States was first published in the Statistical Atlas of Gen. Francis A. Walker in 1874, and the most extensive publication of this kind was published in 1893 as *Weather Bureau Bulletin A*, showing the frequency of storm paths for all parts of the Northern Hemisphere. The wind, rain, and temperature are so distributed around a storm centre that, when its location is known, the distribution of all the others can be closely estimated. In general, in the Northern Hemisphere, the regions that lie to the south of the paths of the storm centres have prevailing warm, moist, southerly winds followed by occasional sudden changes to cool, dry, westerly winds. This change occurs with every passing storm centre, but the prevailing weather is clear and pleasant. Stations lying on the north of the paths of the storm centres have prevailing easterly winds, with cloud and rain followed by cool northwest winds; but the time occupied by the trying easterly winds is proportionately larger.

It is difficult to describe or exhibit the climatic peculiarities of any region without the use of charts. Elaborate publications of this kind, for United States weather, have issued from the Weather Bureau at Washington; the *Climatic Charts for the Years 1870–99* show the normal precipitation for each quarter of the year, the normal percentage of sunshine, the normal barometric pressure, reduced to sea level, the normal temperature of the air at the surface of the earth, the mean maximum and mean minimum temperatures, the highest and lowest recorded temperatures. In addition to these, charts of first and last frost and of prevailing winds have also been published. The ordinary popular textbooks on meteorology are very largely occupied with climatology, properly so called. Of these, that by Prof. Frank Waldo (New York, 1896) is probably the most complete for America; the treatises of Angot,

Traité élémentaire de météorologie (Paris, 1899), and Hann, *Handbuch der Klimatologie* (Stuttgart, 1908–11), are the most complete for European data. But in almost all respects the most careful work of the kind ever published is entitled "Atlas of Meteorology," vol. iii of Bartholomew's *Physical Atlas* (London, 1899). In this we have a general text on climatology accompanied by about 400 maps illustrating the climate and the weather of all parts of the globe for each month and for the whole year, and also an admirable bibliographical list of more important modern publications on this subject. A table of about 40 columns of numerical data would seem to be necessary in order to present the complete idea of climate as imagined by Hann in his great textbook on climatology; but most of these are included in the plates and diagrams collected in Bartholomew's *Physical Atlas*.

Perhaps the most important feature controlling plant life is the relative distribution of temperature and rain from month to month during the year. Climatic types have been elaborated by Harrington, Henry, and others, based upon this distribution of rain. Thus, in one region we have the prevailing summer rains; in another the prevailing winter rains; while in still other places the rains are divided into two seasons with dry weather between. Professor Hinrichs introduced the idea of a climatic distinction based upon the law governing the number of light and heavy rains that had fallen within a given space in a year's time. As the largest falls occurred least frequently, and so also the smallest falls, there is some intermediate rainfall that is most likely to happen. By counting up these different quantities, one obtains a series of numbers that may be represented by the equation of probabilities, and the constant term in this equation becomes the so-called "Hinrichs Climatic Factor."

The influence of climate on crops is a matter of continued investigation in the various agricultural experiment stations throughout the civilized globe, and the reader may refer to the *Experiment Station Record*, published regularly by the United States Department of Agriculture, for the latest information on the subject. A summary of this work has led some authorities to the conclusion that cereal crops are raised successfully only by means of careful special cultivation, so that the resulting crop is not so much an evidence of the influence of climate as of the influence of human skill and husbandry in modifying and assisting climate. In the interior of continents the clear, dry air facilitates great ranges of temperature, both diurnal and annual; the soil is dry, evaporation rapid, and delicate plants do not survive the rigors of cold and drought. On the other hand, an oceanic or insular climate is more uniform as to temperature, moisture, and cloudiness, and more favorable to the development of animals and plants. The influence of climate in disease is principally secondary in that climatic conditions affect the growth of germs, fungi, and noxious animals, through which man suffers.

There is no well-authenticated case of an appreciable change of climate within the past 2000 years. The researches of Eginitis on the climate of Greece seem to establish this principle beyond doubt. Neither is it possible that any change on the surface of the earth due to man—such as deforestation, reforestation, agriculture, canals, railroads, or telegraph lines—can have had anything more than the slightest local effect, if any, on climatic phenomena that depend upon the action of the whole atmosphere. On the other hand, it is probable that appreciable changes have taken place in the course of the very long intervals known as geological periods or æons. The phenomena of the flora, the fauna, the erosion, and the geological stratification all agree in showing that there have been times when, e.g., the Lake Region and the St. Lawrence valley, the Middle States, New England, and southeastern Canada were covered with an extensive ice sheet; a similar condition has prevailed over northwestern Europe. Such changes may have been produced by changes in the elevation of the land and distribution of the ocean, by periodic changes in latitude, by changes in the composition of the earth's atmosphere, or by changes in solar radiation. All of these are plausible causes; but at present there is no agreement of authorities as to the real cause of the changes in so-called geological climate. To these changes in the continents and the climates we may plausibly attribute the development of a great variety of flora and fauna, the migratory habits of birds, the traditions of the early history of the human race, and the extinct plants and animals of paleontology. See EVOLUTION.

One of the most evident causes of the differences of present climates is the relation of the wind to the land and ocean. When the prevailing wind is from the ocean, the land experiences moist and usually cloudy or rainy weather. This is due essentially not so much to the temperature of the water as to the mere fact that water of any temperature will evaporate largely into the air and fill it with moisture. Thus, it is an error to say that the climate of Great Britain and western Europe is affected by the Gulf Stream, or that the climate of California and British Columbia is controlled by the Japan Current; in both these cases it is the moist ocean wind that brings cloud and rain, and the amount of this latter is not influenced in the slightest degree by the Gulf Stream or the Kuro Siwo. Another important consideration in climatology is the relation of the wind to the mountain ranges. Thus, on the windward side of a range, there is ascending air which causes damp weather with cloud or rain; whereas on the leeward side of a mountain range there is descending air, which is always dry and clear and frequently quite warm.

The relation of climate to physiography has been essentially a relation of cause and effect. The surface features of the land, as we now know them, present to us hills and valleys which we may easily recognize as the result of the attacks of wind, water, frost, or heat continued for many ages.

Among the works that treat of meteorological climate, the first place must be given to Bartholomew, *Atlas*, vol. iii, "Meteorology" (London, 1899). For the United States specifically, consult the various publications of the Weather Bureau, and Waldo, *Elementary Meteorology* (New York, 1896). Consult also Woeikof, *Die Klimate der Erde* (Jena, 1887); Hann, *Handbuch der Klimatologie* (3d ed., 3 vols., Stutt-

gart, 1908–11); Solly, *Climatology* (Philadelphia, 1903); Köppen, "Versuch einer Klassifikation der Klimate," in *Geogr. Zeitschr.* (6 Jahrg., 1901); Ward, "The Climatic Zones and their Subdivisions," in *Bull. Amer. Geogr. Soc.* (July, 1905).

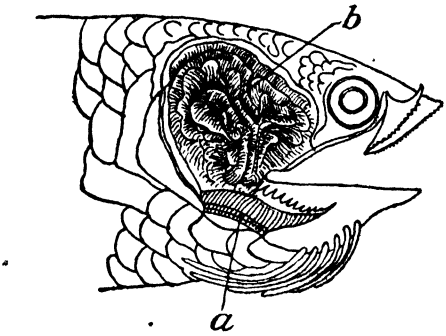
CLIMATE AND DISEASE. The selection of a proper climate is an important factor in the treatment or amelioration of many diseases. According to Barlow, we must consider atmospheric conditions according to temperature, humidity, and sunshine, atmospheric pressure (elevation), movements of winds, and purity of air. The wide variety of climatic conditions found in the United States may be roughly classified as inland, coastal, low altitude (up to 1000 feet), medium altitude (1000 to 3000 feet), high altitude (3000 to 7000 feet), and deserts. A shorter classification divides climates into enervating, of which Florida is the type; sedative or relaxing, typified by the coast of California; and stimulating, as found in mountainous regions. *Ocean or coastal climates* are in general moist and equable, with pure air and freedom from dust and disease germs. Such climatic conditions tend to strengthen the heart action and slow the pulse and have a sedative and relaxing effect on the nervous system. Respiration is made deeper and slower, and the body metabolism is increased. Certain types of chronic pulmonary disease, particularly elderly people with long-standing, inactive lesions, or those complicated with cardiorenal disease, are benefited by an ocean climate. Other cases benefited are those having myocarditis, arteriosclerosis, angina pectoris, many types of nervous diseases, and the acute and chronic bone affections of children. *Inland climates* vary with their distance from the ocean, altitude or nearness to mountain ranges. Low altitudes are generally moist and cold in winter and moist and hot in summer. They are not generally selected for the treatment of disease. Medium altitudes are beneficial to chronic invalids who are able to make a change of residence once or twice a year. In high altitudes the principal feature is purity and dryness of the air, a cool temperature in summer and an abundance of sunshine. The physiological effect of such climates consists in the stimulation of respiratory and cardiac functions, an increased appetite, and sense of well-being. The patient is forced to take more frequent breaths, owing to the rarefied atmosphere. The blood pressure is slightly decreased, and the red blood cells acquire more hæmoglobin and increase in number. Certain types of pulmonary cases are benefited by high altitude, but they must be selected with great care. A tendency towards pulmonary hemorrhage is a contraindication. Certain cases of nervous diseases, in which depression is a feature, are greatly helped by a high altitude. *Desert climates* are characterized by an abundance of sunshine, extreme dryness, warmth, purity of air, and fairly equable temperature. Patients who find most benefit in a desert climate are those having advanced pulmonary tuberculosis, chronic bronchitis or emphysema, rheumatism, gout, arthritis deformans, neuritis, and arteriosclerosis. The climatic treatment of tuberculosis will be considered under that title. Consult article by Barlow, in Hare's *Modern Treatment*, vol. i (New York, 1910).

CLI'MATOLOG'ICAL ASSO'CIA'TION, AMERICAN. A society for the study of climatology, balneology, and the diseases of the respiratory and circulatory organs. It was organized in New York City in 1884 and is composed of physicians residing in the United States and Canada. It consisted in 1912 of 136 members.

CLIMATOL'OGY, CLI'MATOG'RAPHY. See CLIMATE.

CLIMB'ING FERN, or HARTFORD FERN (*Lygodium palmatum*). A species of fern found, rarely, from Massachusetts to Kentucky and southward, remarkable for climbing or twining around weeds and shrubs. The leaves are broadly palmate, and the fertile frondlets form a panicle upon the upper portion of the stem. It is prized for interior decoration of houses. For illustration, see Plate of FERNS.

CLIMBING FISH. One of the small Oriental fishes of the family Anabantidæ, interesting because of the modification of the upper portion of their branchial apparatus into a series of leaflike structures, adapted for retaining small quantities of water. This water is sufficient to keep the gills moist for a considerable time, thus enabling the fish to subsist in mud or out of water. For a special account of this apparatus, consult Dobson, *Proceedings of the Zoological Society of London*, p. 312 (1874). The



HEAD OF CLIMBING PERCH.
a, gills; *b*, leaflike apparatus serving as air-breathing lungs.

numerous species live in fresh water in southeastern Asia and its neighboring islands and in South Africa. The best-known and typical species is the climbing perch (*Anabas scandens*), which is widely distributed in the Orient and especially abundant in the Ganges valley. It is about 6 inches in length, somewhat resembles a perch, and has large scales and a spiny dorsal fin. It has been reported to climb palm trees, but this needs verification. It often, however, leaves pools which are in danger of drying and travels over land in search of water, usually during the night or early morning, while the dew is still on.

CLIMBING HEMPWEED. See MIKANIA.

CLIMBING PLANTS. See LIANAS.

CLINCH. See KNOTTING AND SPLICING.

CLINCHANT, klăn'shăn', JUSTIN (1820–81). A French general, born at Thiaucourt (Meurthe). He studied at the military college of Saint-Cyr, entered the infantry service in 1841, and fought in Algeria, the Crimea, the Italian campaign of 1859, and in Mexico. In 1870, as commander of a brigade of the Third Army Corps, he participated in the battles before

Metz. Having escaped from imprisonment after the capitulation, he was put in command of the Twentieth Army Corps of the Army of the East, with the rank of a general of division. He succeeded Bourbaki (q.v.) as commander of the Army of the East and, intercepted by the Germans under Von Manteuffel in an attempt at retreat, was compelled, with his 84,000 troops, to withdraw into Switzerland. In 1871 he commanded the Fifth Army Corps of the Army of Versailles against the forces of the Commune and was Military Governor of Paris from 1879 to his death.

CLINCH'ER. A character in Farquhar's comedies, *The Constant Lover* and *Sir Harry Wildair.*

CLINCHER-BUILT, or **CLINKER-BUILT.** See BOAT.

CLINCH RIVER. A tributary of the Tennessee River, rising in Tazewell Co., Va., and flowing in a southwestern direction through Virginia and Tennessee (Map: Virginia, A 5), joining the Tennessee River at Kingston. Its length is estimated at over 200 miles.

CLINE'DINST, BENJAMIN WEST (1860–). An American illustrator and painter, born at Woodstock, Va. He studied for a year in Baltimore and for five years in Paris under Cabanel and Bonnat and first attracted attention in New York with his illustrations for *Leslie's Weekly.* He is best known as the illustrator of Thomas Nelson Page's *Unc' Edinburg,* and the works of Hawthorne, Stevenson, and Mark Twain, although he works also in oils and water colors. His sympathetic collaboration with the author gives his work an especial charm. He was awarded the Evans prize of the American Water-Color Society in 1900.

CLING'MAN, THOMAS LANIER (1812–97). An American politician and soldier, born at Huntsville, N. C. He graduated at the University of North Carolina in 1832 and was elected to the State Legislature. From 1843 to 1858, with the exception of one term, he was a Whig member of Congress, where he became known as a brilliant debater. In 1858 he was selected by the Governor of his State to fill a vacancy existing in the United States Senate, whence, in 1861, he withdrew to become a colonel in the Confederate army. He was promoted to be brigadier general, served throughout the war, and in 1868 was a delegate to the National Democratic Convention. The existence in North Carolina of diamonds, rubies, corundum, platinum, and mica was first made known by him. He published *Speeches and Writings* (1877); *Follies of the Positive Philosophers* (1878); *The Tobacco Remedy* (1885).

CLINGMAN'S DOME. One of the two highest peaks of the Great Smoky Mountains, situated in Tennessee, just across the border from North Carolina (Map: North Carolina, A 4). It is 6619 feet above sea level. It was named after Thomas L. Clingman.

CLIN'IC (Lat. *clinicus,* Gk. *κλινικός, klinikos,* pertaining to a bed, from *κλίνη, klinē,* from *κλίνειν, klinein,* to recline). An institution or a department of a medical college, which is devoted to the examination and free treatment of patients. Notwithstanding the derivation of the term, "clinical" lectures have for many years been delivered, not at the bedside, but in lecture rooms, to which patients are able to come from their homes. The term "clinic" is often applied also to institutions where free medical treatment is furnished to patients who are able to walk in and return to their homes, but where there are no beds, as in a hospital. (See DISPENSARY.) The term *clinical medicine* is applied to the branch of medicine occupied with the investigation of diseases at the bedside.

CLINIC BAPTISM. In the ancient Church baptism administered to a person on a sick bed or deathbed. As such a baptism was irregular and the usual rites could not be observed, the question was discussed whether it was valid. In the third century Novatian declared that such baptized persons should not be ordained, and in 314 the Synod of Neo-Cæsarea so ordered, and this prohibition was renewed by the sixth Synod of Paris in 829. St. Cyprian insisted strongly on the validity of such baptism. See BAPTISM.

CLINK, THE (Ger. *Klinke,* Dan. *klink,* Swed. *klinka,* bolt, latch, from Ger. *klingen,* OHG. *chlingan,* Dan. *klinge,* Swed. *klinga,* to clink, to jingle). An old prison at Bankside, London, in the jurisdiction of the Bishop of Winchester, used for criminals of that part of the Manor of Southwark which was known as "The Liberty of Clink," and not embraced in the original grant to the city of London (about 1327). The later grant was made expressly for the purpose of securing jurisdiction over the malefactors of the city of London who fled to Southwark. The name has come to mean the "guardhouse," in the modern parlance of "Tommy Atkins."

CLINK'ER, HUMPHREY. The hero of Smollett's novel of the same name.

CLINKER-BUILT. See BOAT.

CLINK'ERS (from *clink,* Ger. *klingen,* to jingle). The scales or globules of black oxide of iron, obtained from red-hot iron under the blows of a hammer. The same term is applied to the slag of iron furnaces, to the calcined products of cement kilns, and, generally, to the slaglike refuse of furnaces of all kinds. The clinker produced from the burning of coal is due to the chemical combination of oxide of iron and the silica contained in the ash of the coal. The cinder-like masses which form the crust of some lava streams are called clinkers by geologists.

CLINK'STONE'. See PHONOLITE.

CLINOM'ETER (from Gk. *κλίνειν, klinein,* to incline + *μέτρον, metron,* measure; cf. Fr. *clinomètre*). An instrument used by geologists for ascertaining the dip or inclination from the horizontal of bedded rocks or veins. It consists of a graduated arc, with a pendulum or plumb line hung at the centre. When the instrument is placed on a horizontal surface, the pendulum points to 0°, while on an inclined surface the pendulum assumes a position corresponding to the angle of inclination. The clinometer is sometimes attached to a compass, which latter is required for determining the direction of outcrop or strike of rocks.

CLI'NOSTAT (from Gk. *κλίνειν, klinein,* to incline + *στατός, statos,* placed, from *ἱστάναι, histanai,* to stand). An apparatus for rotating plants, periodically or constantly, in any desired plane, for the purpose of eliminating or equalizing the effect of any directive stimulus, such as light or gravity. (See IRRITABILITY.) It consists essentially of a strong clockwork, driven by a spring or weight, with vanes or other device for controlling the speed of the mechanism, which may usually be adjusted to make one rotation in 10 to 30 minutes. Suitable tables and

clamps for holding the vessel containing the plants are provided. The intermittent clinostat is so arranged that at given intervals the mechanism is released and permitted to impart a quarter or a half rotation to the plant.

CLIN'TON. A town in Huron Co., Ontario, Canada, 130 miles west of Toronto, 50 miles north of London, on a branch of the Grand Trunk Railway (Map: Ontario, C 6). It has a collegiate institute, model and public schools, a customs office, town hall, library, park, and is the residence of a United States consular agent. Manufactured products include pianos and organs, and automobiles, and there are planing, flour, and knitting mills, and hosiery and clothing factories. Grain and live stock are shipped. Near the town are valuable salt wells. The town owns its lighting and water works. Pop., 1901, 2547; 1911, 2254.

CLINTON. A city and the county seat of Dewitt Co., Ill., 22 miles south of Bloomington, on the Illinois Central and the Illinois Traction railroads (Map: Illinois, D 3). It is in a fertile agricultural region and has railroad shops, a public library, and a hospital. Clinton has adopted the commission form of government. The city owns and operates its water works. Pop., 1900, 4452; 1910, 5165.

CLINTON. A city and the county seat of Clinton Co., Iowa, 138 miles by rail west of Chicago, Ill.; on the Mississippi River, and on the Chicago and Northwestern, the Chicago, Milwaukee, and St. Paul, the Chicago, Burlington, and Quincy, the Chicago, Rock Island, and Pacific, the Davenport, Rock Island, and Northwestern, and the Iowa and Illinois railroads (Map: Iowa, G 3). The Mississippi is crossed at Clinton by one railway and two wagon bridges, one of the latter being a mile long. The city contains two academies and Wartburg College (Lutheran), founded in 1894, three hospitals, a public library, and several parks. Its manufactures are extensive, including machinery, boilers, wagon boxes, furniture, locks, sashes and doors, overalls, boxes, wire, cloth, brick, paper, etc. The Chicago and Northwestern Railroad has large stockyards and machine shops in Clinton; and there are also bridge and iron works, sugar refineries, and roofing mills. Lyons, which in 1890 had 5799 inhabitants, was annexed to Clinton in 1895. Pop., 1890, 13,619; 1900, 22,698; 1910, 25,577.

CLINTON. A town in Worcester Co., Mass., 12 miles (direct) north by east of Worcester, on the Nashua River, and on the Boston and Maine and the New York, New Haven, and Hartford railroads (Map: Massachusetts, D 3). It manufactures ginghams and plaids, machinery, wirework, worsteds, carpets, etc. The town owns and operates its water works and has a large public library, a hospital, home for aged people, a fine municipal building, and a park. The Wachusett Dam and Reservoir, which supplies water to Boston and the metropolitan district, is situated here. Clinton was a part of Lancaster until 1850, when it was separately incorporated. Its government is administered by town meetings. The board of selectmen, who are elected for three years, appoint the chief of police, engineers, and other officers. Pop., 1900, 13,667; 1910, 13,075.

CLINTON. A town in Hinds Co., Miss., 9 miles west-northwest of Jackson, on the Alabama and Vicksburg Railroad (Map: Mississippi, E 6). It is the seat of Mississippi College (Baptist) and of Hillman College. The water works and light plant are owned by the town. Pop., 1910, 767.

CLINTON. A city and the county seat of Henry Co., Mo., 88 miles by rail southeast of Kansas City, on the Missouri, Kansas, and Texas, the St. Louis and San Francisco, and the Kansas City, Clinton, and Springfield railroads (Map: Missouri, C 3). It has large flour mills and exports hogs, cattle, coal, flour, and agricultural products. There are four artesian wells which have a considerable flow of white sulphur. The Clinton German Seminary is situated here. Settled in 1835, Clinton was incorporated as a village in 1840 and at present is governed under a general law, revised in 1899, which provides for a mayor, who holds office for two years, and a city council. The electric-light plant and street railways are owned by the city. Pop., 1890, 4737; 1910, 4992.

CLINTON. A village in Oneida Co., N. Y., 9 miles southwest of Utica, on the New York, Ontario, and Western Railroad and on Oriskany Creek (Map: New York, E 5). It is the seat of Hamilton College (q.v.) and contains a public library. Knit and canned goods are manufactured. There are iron-ore mines and mineral springs in the vicinity. The water, sewer, and electric-light distribution systems are owned by the municipality. Pop., 1900, 1340; 1910, 1236.

CLINTON. A city in Custer Co., Okla., 96 miles by rail west of Oklahoma City, on the Chicago, Rock Island, and Pacific, the Clinton and Oklahoma Western, the St. Louis and San Francisco, and the Kansas Central, Mexico, and Orient railroads, and on the Washita River (Map: Oklahoma, C 3). The chief industries are the milling of alfalfa and the manufacture of cottonseed oil and meal. The city contains a broom factory, cotton compress, municipal hospital, and superior court building. Clinton owns its water works and electric-light plant. Pop., 1900, 1278; 1910, 2781.

CLINTON. A town in Laurens Co., S. C., 60 miles northwest of Columbia, on the Seaboard Air Line and the Columbia, Newberry, and Laurens systems (Map: South Carolina, C 2). It contains the Presbyterian College of South Carolina and the Thorwell Orphanage. The leading industry is the manufacture of cotton. The water works and electric-light plant are owned by the town. Pop., 1900, 1869; 1910, 3272.

CLINTON, DEWITT (1769–1828). An American statesman. He was born at Little Britain, Orange Co., N. Y., March 2, 1769, the son of James Clinton, and was educated at Columbia College, graduating with high honors in 1786. Choosing the law for his vocation, he studied under Samuel Jones and was admitted to the bar in 1788. He entered immediately into political life, opposing the adoption of the Federal Constitution, and becoming an ardent supporter of his uncle, George Clinton (q.v.), who was then Governor of the State and a leader of the Anti-Federalist party. In 1797 he was elected to the State Assembly as a representative of New York City, where he made his residence, and the next year was chosen State Senator for four years. He also became a member of the Council of Appointment. Up to this time the Governor had exercised the exclusive right to make nominations; but Clinton vigorously attacked the system, succeeded in 1801 in procuring an amendment to the Constitution giving

the members of the Council of Appointment equal rights of nomination with the Governor, and by this means introduced the "spoils system" into New York politics, though it seems he was really opposed to the wholesale proscription of opponents. During this period he found time to devote himself to scientific and social questions—especially the use of steam in navigation, and the abolition of slavery and its kindred barbarism, imprisonment for debt. In 1802, when but 33 years of age, he became a member of the United States Senate, but soon resigned to accept the office of mayor of New York—an appointment made by his uncle, the Governor, and the Council of Appointment; and this position he held, with two short intermissions, until 1815. While mayor, he was also at various times State Senator, a member of the Council of Appointment, a commissioner on the Erie Canal route, and from 1811 to 1813 Lieutenant Governor of the State. After the retirement of his uncle from active participation in State politics in 1804, he speedily became the leader of the Republican party in New York and in 1812 was chosen as its candidate for President. Madison was nominated by the Republican Congressional Caucus; but the New York section of the party, tired of Virginian control, insisted on running Clinton and made a coalition with the Federalists for that purpose. Clinton, however, received only 89 electoral votes to 128 for Madison. The canvass had been hardly creditable to Clinton, and he was not henceforth an important figure in national politics; but as a great benefactor of his State in his later years he won fame and success. He took a leading part in establishing the free-school system of New York City and in the establishment and promotion of various institutions of science, in the improvement and modification of criminal laws, in the extension of agriculture and manufactures, in the relief of the poor, and the improvement of morals. But his greatest service was his promotion of the Erie Canal project. As citizen and commissioner, his zeal, energy, and optimism in planning and urging on the completion of this great waterway inseparably connected his name with the enterprise, both in the minds of its friends and in the minds of those who sneered at "Clinton's Folly." The canal became a political question, and on this issue Clinton was elected Governor in 1817. One of his first duties as Governor was to break ground for the canal at Rome. He was reëlected in 1820, but declined a hopeless nomination in 1822. His political opponents, led by Martin Van Buren and the "Albany Regency" (q.v.), sought to end his political career, and in 1824 removed him from the office of canal commissioner. This partisan act provoked a storm of public indignation, which elected Clinton Governor in that year—an office which he held until his death. The next year he opened the Erie Canal. He wrote: *Discourse before the New York Historical Society; Memoir on the Antiquities of Western New York; Letters on the Natural History and Internal Resources of New York; Speeches to the Legislature.* Consult: *Lives*, Hosack (New York, 1829) and Renwick (New York, 1840); Campbell, *Life and Writings of De Witt Clinton* (New York, 1849); Alexander, *Political History of the State of New York*, vol. i (New York, 1906); Orth, *Five American Politicians* (Cleveland, 1906); McBain's *De Witt Clinton and the Origin of the Spoils System in New York* (New York, 1907).

CLINTON, GEORGE (1739–1812). An American statesman, born in Little Britain, N. Y. In the French and Indian War he served as a lieutenant in the expedition against Fort Frontenac and after the war entered law and politics. He was chosen to the Colonial Assembly and to the Continental Congress, was made brigadier general in the Revolutionary army, and in 1777 was elected first Governor of New York. He was reëlected and occupied the executive chair for 18 years and in 1801 was chosen for one more term. From 1805 until his death he was Vice President of the United States. While Governor, his discretion in civil affairs and his military services were of great value to the State. He opposed the ratification of the Federal Constitution in the belief that it granted too great powers to the national officers, and while presiding officer of the Senate, during his term as Vice President, defeated by his deciding vote the rechartering of the United States Bank (1811). Consult the *Public Papers of George Clinton* (6 vols., New York, 1899–1902).

CLINTON, GEORGE PERKINS (1867–). An American botanist, born at Polo, Ill. He was educated at the University of Illinois and at Harvard University. From 1890 to 1902 he was assistant botanist at the Illinois Agricultural Experiment Station and assistant in botany at the University of Illinois; thereafter he served as botanist at the Connecticut Experiment Station and as botanist of the Connecticut State Board of Agriculture. He was a vice president of the American Association for the Advancement of Science (Section of Botany) in 1914. He is author of experiment-station bulletins, including *The Russian Thistle* (1895); *Broom-Corn Smut* (1897); *The Smuts of Illinois Agricultural Plants* (1900); *Apple Scab* (1901); *Apple Rots in Illinois* (1902); *Test of Summer Sprays on Apples, Peaches, etc.* (1912).

CLINTON, GEORGE WYLIE (1859–). An American negro bishop, born in Lancaster Co., S. C., of slave parents. He studied at Brainerd Institute (Chester, S. C.), at South Carolina University, and at Livingstone College, Salisbury, N. C. He entered the ministry of the African Methodist Episcopal Zion church in 1879; founded in 1889 the *Quarterly Review* of that denomination, which he edited for two years, and also edited the *Star of Zion* (1902–06); and was elected Bishop in 1896. He had taught in South Carolina and had been for a time president of the Atkinson Literary and Industrial College in Madisonville, Ky. He wrote: *The Negro in the Ecumenical Conference of 1901* (he was delegate to the Ecumenical Council); *The Three Alarm Cries* (1906); *Tuskegee Lectures* (1907); *Christianity under the Searchlight* (1909).

CLINTON, SIR HENRY (c.1738–95). A British general in the American Revolution. He was the son of Admiral George Clinton (Governor of Newfoundland from 1732 to 1741 and of New York from 1741 to 1751), and the grandson of Francis, sixth Earl of Lincoln. He was a member of Parliament for Boroughbridge and for Newark between 1772 and 1784, during which time he was in the army in America. He served as major general (local lieutenant general) at the battle of Bunker Hill and took possession of New York after the defeat of Washington's forces in the battle of Long Island

(Aug. 27, 1776). For his part in that battle he was promoted lieutenant general and knighted. In 1778 he succeeded Sir William Howe as commander in chief, and, on his march from Philadelphia to New York, fought the unsuccessful battle of Monmouth (q.v.). In December, 1779, he led an expedition to South Carolina, and on May 12, 1780, captured Charleston, with General Lincoln's army of 6000 men. Replaced in command by Sir Guy Carleton in 1782, Clinton returned to England. Soon afterward he published his *Narrative of the Campaign of 1781 in North America* (1783), over which he and Cornwallis had a bitter controversy. He was again elected to Parliament in 1790, was made a general in 1793, and from 1794 until his death was Governor of Gibraltar.

CLINTON, HENRY FYNES (1781–1852). An English classical scholar, born at Gamston, in Nottinghamshire. He graduated at Oxford in 1805 and was a member of Parliament from 1806 to 1826. His two great works are the *Fasti Hellenici* (1824–34), and the *Fasti Romani* (1845–50), dealing respectively with the civil and literary chronology of Greece, and the civil and literary chronology of Rome and Constantinople. These works set classical chronology upon a solid and scientific basis. Consult *The Literary Remains of Henry Fynes Clinton*, by his brother (London, 1854).

CLINTON, JAMES (1736–1812). An American soldier, born in Ulster Co., N. Y. He was a brother of George Clinton (1739–1812) and the father of De Witt Clinton. He early entered the English army, served as a captain in the French and Indian War, and distinguished himself at the capture of Fort Frontenac. On the outbreak of the Revolution he took the side of the Colonies and was made a colonel. He accompanied Montgomery to Quebec as brigadier general and in 1777 was in command of Fort Clinton when it was captured by the British, after a brilliant defense, in which he received a bayonet wound. He was engaged against the Indians in General Sullivan's Iroquois expedition (1779) and was present at the siege of Yorktown. He was delegate to the New York Convention which ratified the Federal Constitution and was afterward a commissioner to adjust the boundary line between Pennsylvania and New York.

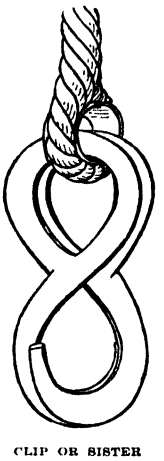
CLINTON STAGE. A name given to a subdivision of the Silurian system. The Clinton stage takes its name from the type locality at Clinton, N. Y.; but the strata are widely distributed in the eastern part of the United States, occurring along the Appalachians from New York to Alabama, and also in Ohio, Indiana, Kentucky, Wisconsin, and in Ontario, Canada. The prevailing rocks are sandstones, limestones, and shales, which attain a maximum thickness in the aggregate of about 1000 feet. A noteworthy feature of the Clinton stage is a persistent bed of oölitic iron ore that is the basis of an active mining industry in New York, Tennessee, and Alabama. See SILURIAN SYSTEM.

CLINTON STATE PRISON. A prison located in Dannemora, Clinton Co., N. Y. It was begun in 1844 and comprises a number of buildings inclosed in a stockade which surrounds 37 acres of land. This location was chosen for the purpose of employing convicts in the mining and manufacture of iron, there being abundance of that ore on the tract belonging to the prison or to the State. The industries at present conducted in the prison include the making of clothing, tinware, wooden ware, and cotton spinning.

CLI'O (Lat., from Gk. Κλειώ, *Kleiō*, from κλείν, *klein*, to celebrate, from κλέος, *kleos*, glory). In Grecian mythology, one of the Nine Muses (q.v.). When to the individual muses specific functions were assigned, Clio was at first called muse of epic poetry; later, and more commonly, she was regarded as the muse of history. In ancient art her common attribute is a partly opened roll.

CLIO. A prominent genus of pteropod mollusks. See PTEROPODA.

CLIO. A pen name of Addison, suggested by the letters "C," "L," "I," "O," with which, respectively, he signed his articles in the *Spectator*, according as he wrote at Chelsea, London, Islington, or "The Office."



CLIP OR SISTER HOOK.

CLIP'EUS. See SHIELD.

CLIP HOOKS. Two hooks, with points lying in opposite directions, made in such a manner that they overlap and fit closely so as to form a single eye when the necks are lashed together; the eyes of the separate hooks are in the same thimble or on the same pivot and also fit closely to each other when the necks are brought together.

CLIP'PER (probably connected with Dutch *klepper*, fast horse, from *kleppen*, to run swiftly, and thus with Eng. *clap*). A sailing vessel built with very sharp lines, more or less raking masts, and great spread of canvas, with a view to speed; a development of a model for the mercantile marine, first built in the United States at Baltimore, and called the *Baltimore Clipper*. The clippers, becoming famous for quick runs and occasionally making better time than the steamers, were especially employed in the South American trade, in the China trade (for tea and opium), and in the early California trade, via Cape Horn. For many years the "fruit clippers" were celebrated for their rapid passages; and the "opium clippers" and "slavers" attained an unenviable notoriety for speed. A "clipper ship," as compared with the ordinary sailing ship, is longer and generally of less beam in proportion to her length; very sharp at the bows, which are hollowed more or less below the water line; gracefully fined away towards the stern, which is almost always elliptical; and, in fact, the comparison of the race horse to the beast of burden holds good in comparing the clipper to the ordinary sailing ship. The first American clipper was the *Rainbow*, a vessel of 750 tons, built in 1843 for the China trade. The largest of these craft was the *Great Republic*, 325 feet in length, 53 feet beam, and 37 feet depth of hold, of 4000 tons' capacity. The Aberdeen builders and Mr. Scott Russell, in England, built some of the most magnificent clipper ships that have sailed the ocean. Among the fastest passages are those made by the *Flying Cloud* in 1851, New York to San Francisco in 89 days and 18 hours, making 374 miles in one day. This record, however, was reduced by the *Comet*, which made the same trip

in 83 days; in 1854, by the *Lightning*, Boston to Liverpool, 2827 miles, in 13 days, and Melbourne to Liverpool, 12,190 miles, in 64 days: in 1865, by the *Nightingale* from Melbourne to New York, 12,720 miles, in 73 days; the *Thornton*, Sandy Hook to Liverpool, 3000 miles, in 13 days, 9 hours; this record was equaled by the *Dreadnaught* in 1859; 1869, the *Golden Gate*, an iron clipper ship, from Liverpool to San Francisco, 13,800 miles in 100 days. The clipper, which was at its prime during the period from 1840 to 1855, at the advent of the steamship underwent numerous transformations as the ends of commerce demanded a greater cargo-carrying capacity at the expense of speed, and as a type gradually passed away; changes were made in the lines and rig, and smaller crews were carried, with the object of increasing tonnage capacity and competing with steamships by lower freight rates. The effect of the model, however, was shown in many subsequent ships and yachts.

CLIPPER BOW. The overhanging bow, with short bowsprit (chiefly ornamental), which is found in some wooden steamers. The bow of most steamers has a vertical stem. The clipper bow differs from the old sailing-ship bow in rising in a smooth curve from the cutwater to the scrollhead, while the latter had a reverse curve as it approached the bowsprit.

CLISSON, klē'sôN', Olivier de (1336–1407). A French soldier, born in Brittany. He fought in the Hundred Years' War, at Auray (1364), on the English side; later, after his quarrel with Duke John IV of Brittany, he took part under Bertrand de Guesclin in the campaigns (1370–80) against the English. In 1380, upon De Guesclin's death, Clisson succeeded him as constable of France, and thereafter he commanded the army in Poitou and in Flanders, where he defeated (1382) the citizens of Ghent at Roosebek. In 1385 he sailed with a fleet of 62 vessels to invade England, but was driven back by a great storm. Forced into exile in Brittany by the uncles of Charles VI, Clisson made his peace with Duke John IV, after whose death (1399) he was regent of the duchy. Consult A. Lefranc, *Olivier de Clisson* (Paris, 1898).

CLIS'THENES, klis'thē-nēz (Lat., from Gk. Κλεισθένης, *Kleisthenēs*). An Athenian statesman, son of Megacles and Agariste, daughter of Clisthenes of Sicyon. He was, on his father's side, a member of the celebrated family of the Alcmæonidæ (q.v.). He took a prominent part in the expulsion of Hippias in 510 B.C. When Isagoras (q.v.), the head of the oligarchical party at Athens, called in Cleomenes I (q.v.), King of Sparta, Clisthenes, with 700 heads of families, was forced to retire from the city, but was afterward recalled. He made important changes in the Athenian Constitution, which he rendered more democratic. The basis of his reform was the redistribution of the people; instead of four tribes, or phylæ, which had previously existed, he made the number 10, and distributed among these the demes into which the Attic territory was divided. For the nature of these arrangements and their purpose, see Athens, *History*. He also instituted ostracism, and, according to Ælian, was the first to suffer therefrom. See Boule; Deme; Ecclesia.

CLISTHENES OF SICYON. Tyrant of Sicyon, early in the sixth century B.C., grandfather of Clisthenes the Athenian. (See the preceding article.) He aided Delphi against Crisa and brought about the reëstablishment of the Pythian Games.

CLITANDRE, klē'täN'dr'. A favorite name with Molière, who calls four different characters by it: (1) the sensible lover of Henriette in *Les femmes savantes;* (2) the lover of Angélique in *Georges Dandin;* (3) a titled lover of Célimène in *Le misanthrope;* (4) the lover of Lucinde in *L'Amour médecin.*

CLITAR'CHUS. A Greek historian, who accompanied Alexander the Great on his expeditions and described Alexander's exploits down to the battle of Issus. Both Cicero (*Brutus*, 42) and Quintilian (x, i, 74) throw doubts on his trustworthiness. His importance lies in the fact that his work was popular and much used by writers on Alexander as well as by Quintus Curtius, Plutarch, Justin, and Diodorus Siculus.

CLITH'EROE (Welsh *Cled-dwyr*, cliff near the waters). A town of Lancashire, England, on the Ribble, and at the foot of the Pendle Hills, about 28 miles north of Manchester (Map: England, D 3). Its notable buildings include the church of St. Michael's, the ancient grammar school founded by Philip and Mary in 1554, and the ruins of an old castle built by one of the De Lacy family in the twelfth century. The town has a free public library and a technical school. Its industries consist of cotton and paper mills, and in the neighborhood are extensive limestone quarries and peat mines. Near Clitheroe is the Jesuit College of Stonyhurst. Pop., 1891, 10,800; 1901, 11,414; 1910, 12,500. Clitheroe and Pontefract were the two seats of the De Lacy family in Norman times.

CLITOM'ACHUS (Gk. Κλειτόμαχος, *Kleitomachos*, or possibly Κλειστόμαχος, *Kleistomachos*) (c.180–c.110 B.C.). A Greek philosopher of the New Academy, the most important among the pupils of Carneades, whose spoken philosophy he put in writing, and whom he succeeded as leader of the school. He was a Carthaginian by birth, was called Hasdrubal in his own tongue, came to Athens about 147, and became head of the New Academy in 129. Of his works, about 400 in number, we have no direct remains; Cicero, who praises him highly in his *Academica*, used Clitomachus' treatise Περὶ Ἐποχῆς, *Peri Epochēs, On Suspension of Judgment.* To some extent, also, Cicero based on Clitomachus' works his *De Natura Deorum*, his *De Fato*, and his *Tusculanæ Disputationes.* He was well known at Rome, if we are to believe Cicero's statement that Crassus heard him lecture at Athens in 111, and that he dedicated one of his books to the poet Lucilius and one to Lucius Censorinus, Consul in 149 B.C. Consult Zeller, *The Stoics, Epicureans, and Sceptics*, trans. by Reichel (London, 1892).

CLITUM'NUS. A river of Italy, famous through the description given by Pliny the Younger (*Epistles*, viii, 8) of the spring which formed its source, a spring still beautiful. It rose in Umbria, between Spoletium and Trebia, and fell into the Tiber.

CLI'TUS (Lat., from Gk. Κλεῖτος, *Kleitos*) (?–328 B.C.). The foster brother of Alexander the Great. He was the dearest friend of the King, whose life he saved at the battle of the Granicus. He held high positions in the Macedonian armies and in 328 was made satrap of Bactria. At a banquet given by Alexander in honor of the Dioscuri, the King, goaded to madness by the censures of Clitus, who re-

proached Alexander with slothfulness, seized a spear and in his drunken rage slew him. Alexander bitterly repented and showed his grief in the most extravagant manner.

CLITUS. In Shakespeare's *Julius Cæsar*, the servant of Brutus.

CLIVE, klīv, CATHERINE (1711–85). A noted English actress, familiarly called "Kitty Clive." She was a daughter of William Raftor, an Irish gentleman of reduced circumstances, living in London. There is a doubtful story about her having been overheard singing while scrubbing a doorstep where there were some members of the Beefsteak Club, and so securing a chance to begin her career. At any rate, during Colley Cibber's management of Drury Lane, she made her appearance there as a page, with a song, in Lee's tragedy of *Mithridates*, probably in 1728. She made a great hit, which she repeated in 1729 as Phillida in Cibber's *Love in a Riddle*, and in 1731 in Charles Coffey's *The Devil to Pay*. About 1732 she was married to George Clive, second cousin of the famous Lord Clive. In 1742 she sang the part of Delilah in Handel's *Samson*, then first produced. She left Drury Lane in 1743, during Fleetwood's management, but resumed her connection with that theatre when Garrick took its direction, three years later. Her last appearance was in 1769, as Violante in the comedy of *The Wonder*, Garrick himself, out of compliment to her, taking the part of Don Felix. Mrs. Clive's talents were seen to best advantage in comic parts, to which, however, she was not always satisfied to restrict herself. Her vigorous wit and sound sense made her the welcome companion of some of the notable people of her time. In her later life she was an intimate friend of Horace Walpole, who gave her a house at Strawberry Hill. She died Dec. 6, 1785, and was buried at Twickenham. Consult: Fitzgerald, *Life of Mrs. Catherine Clive* (London, 1888); Austin Dobson, in Matthews and Hutton, *Actors and Actresses of Great Britain and the United States*, vol. i (New York, 1886); Doran, *Annals of the English Stage* (London, 1888); Thos. Davies, *Memoirs of the Life of David Garrick* (ib., 1784).

CLIVE, ROBERT, BARON CLIVE OF PLASSEY (1725–74). An English general, whose achievements laid the foundations of the British Indian Empire. His father, a lawyer and small landowner, came of an ancient Shropshire family, whose manor seat, Styche, near Market Drayton, dates from the reign of Henry II. There Clive was born, Sept. 29, 1725, the eldest of 13 children. He spent several years with an uncle at Hope Hall, near Manchester, and at various schools showed more aptitude for pugilism and mischievousness than for study. At 18 years of age he shipped to Madras as a writer to the East India Company, where he dragged on an unhappy and quarrelsome existence as a mere drudge in the employ of the company until the outbreak of the great struggle between the French and the English in India. He applied for and obtained an ensign's commission and distinguished himself in Boscawen's unsuccessful siege of Pondicherry in 1748. His dauntless courage, previously exhibited in a duel which forms the idealized subject of Browning's poem "Clive," now had scope for development. English influence was almost extinct in India, through the prestige of the French and their allies. In 1751, with 500 mixed English and Sepoy troops, Clive marched from Madras and captured Arcot, a city of 100,000 inhabitants, garrisoned by 1500 of Chunda Sahib's best troops. The daring displayed in the capture of Arcot was equaled by the intrepidity and fortitude exhibited in its successful defense by Clive and his little band, reduced to 200 men, against a besieging army of 7000 natives and French, and impressed the natives with the strength and prowess of Britain. The succeeding campaign, in which successes and personal escapes were of a most dramatic character, included the victories of Arni and Kaveripak and the capture of Kovilam and Chingalpat. Henceforward Clive's name was a local tower of strength; the natives surnamed him "Sabat Jung," or "the Daring in War," and Pitt described him as "the youth of 27 years" who had done the deeds of a "heaven-born general." In 1753, with his bride, Margaret Maskelyne, sister of the astronomer, he visited England and received a diamond-hilted sword and the warm thanks of the India Company. Possessed of a moderate fortune, obtained from prize money, he expended part in redeeming the paternal estate and relieving his father from pecuniary embarrassment. The rest soon disappeared in an unsuccessful parliamentary contest and in luxurious display. He returned to India in 1755 and in 1756 was called to avenge the Black Hole (q.v.) atrocity perpetrated by Siraj-ud-Daula, Nawab of Bengal. Clive advanced against the Nawab, and in January, 1757, the English were again in possession of Calcutta. A peace was arranged; but Clive, bent upon a brilliant exhibition of his powers and eager for the riches of Bengal, soon returned to the struggle. To insure his success, he entered into a plot for the elevation to the throne of Bengal of Siraj-ud-Daula's general, Mir Jaffir, who was to desert his chief, and who promised to shower wealth on Clive and the East India Company for his services. On June 23, 1757, Siraj-ud-Daula was overthrown in the battle of Plassey. This victory decided the ascendancy of England over France in India and was followed by the rapid building up of a British Indian empire. Mir Jaffir was placed upon the throne of Bengal and kept his promises. From shares in these and other spoils and from presents and territorial grants from native princes, Clive amassed vast wealth, which yielded an annual income of £40,000. After managing the affairs of the East India Company at Calcutta for some years and winning fresh victories, he returned to England in 1760 and was loaded with thanks and honors. He became parliamentary member for Shrewsbury, was raised to the Irish peerage as Baron Clive of Plassey, and in 1764 was created Knight of the Bath. Through the dishonesty of its servants, high and low, the affairs of the company became greatly involved after his departure from India, and in 1765 he was sent out to set them right. He proved as competent an administrator as a warrior; and in less than 18 months, by raising salaries, abolishing perquisites, reorganizing the army and ruling with a rod of iron, he "restored perfect order and discipline in both the civil and military services and brought back prosperity to the well-nigh ruined finances of the company." He returned to England in 1767 and was received with the distinction to which he was entitled. But the energy he had displayed in righting Indian affairs antagonized many who suffered pecuniarily from the suppression of dishonest practices;

and they, possessing influence, employed it in raising English feeling against Clive. His Indian administration was made the subject of animadversion in Parliament in 1772, which he at first ignored, but subsequently replied to in a vigorous and eloquent speech, which elicited Pitt's admiration. A parliamentary inquiry, the following year, demonstrated that in certain particulars Clive's treatment of the natives had been questionable. A large part of his enormous wealth was shown to have come from presents from the natives, a fact justified by custom. But at the same time Clive undoubtedly, as in the case of Omichand, acted disgracefully. A qualified acquittal from Parliament, which acknowledged his "great and meritorious services," was not satisfactory to Clive, who never recovered from the disgrace implied in the trial; this, with sickness, recourse to opium to alleviate his sufferings, and mental depression, led to his suicide, Nov. 22, 1774.

Clive was an able man and got India for England. Perhaps Macaulay was justified in saying that "Clive, like most men who are born with strong passions and tried by strong temptations, committed great faults, but our island has scarcely ever produced a man more truly great either in arms or in council." Consult: Malcolm, *Life of Clive* (3 vols., London, 1836); Malleson, *Founders of the Indian Empire: Lord Clive* (ib., 1882); 'id., *Decisive Battles of India* (ib., 1883); Mill, *History of British India*, vol. iii (ib., 1858); Macaulay, *Essay on Clive* (ib., 1840); Arbuthnot, *Lord Clive* (ib., 1899).

CLOACA, klō-ā'kȧ (Lat., sewer). The cloacæ were subterranean drains, usually built of stone. In Rome the early city was drained by three natural streams, which were later confined within channels built of stone and vaulted, the largest of which, crossing the Argiletum, Forum, and Velabrum, was called, from its size, the Cloaca Maxima, though that of the Vallis Murcia and that near the Circus Flaminius rival it in size and solidity. A network of smaller passages empty into these main channels. The system was largely due to the Tarquins. The Cloaca Maxima was upward of 13 feet in width and of corresponding height, vaulted with three thicknesses or layers of large stones laid without cement, of the uniform size of over 5 feet long and 3 feet high. The flooring is paved like a Roman road, and the side walls are built of huge blocks of Gabii stone. The sewer was constantly flushed with the superfluous water from the aqueducts. Portions of the cloacæ are still visible, but the greater part lie far below the present level of the streets. The mouth of the Cloaca Maxima at the Tiber is still visible. During the Republic the surveillance of the Roman cloacæ was one of the duties performed by the censors. The Cloaca Maxima was repaired by Cato and his colleagues in the censorship. Agrippa, when ædile, is recorded to have passed through the cloacæ in a boat. Under the Empire officers called *curatores cloacarum urbis* were appointed for their supervision. So thoroughly was the city undermined by these large sewers that Pliny calls it *urbs pensilis*, a city suspended in the air rather than resting upon the earth. Drains of the same description, but of smaller dimensions, existed in other ancient Roman cities.

CLOACA MAXIMA. See CLOACA.

CLOCHES DE CORNEVILLE, LES, lȧ klôsh' dẽ kōr'n'-vēl'. A very popular operetta, in three acts, produced at the Folies Dramatiques in 1877. The amusing libretto is by Clairville and Charles Gabet; the music, from which many airs have become popular, by Robert Planquette.

CLOCK (AS. *clucge*, Icel. *klukka*, Ger. *Glocke*, bell, from ML. *clocca*, bell, from OIr. *cloc*, Ir. Gael, *clog*, bell, clock, Welsh, Corn. *cloch*, Manx *clagg*, bell). A mechanical instrument for measuring and indicating the time of day, usually by a mechanism consisting of two distinct portions: first, a train or succession of toothed wheels for transmission to a definite point of a motive force, produced by a weight or spring, or the action of an electric current on an electromagnet or system of magnets; and, second, an escapement to regulate the expenditure of this motive force with uniformity and requisite slowness. A watch is simply a portable clock, to be worn on the person, in which the motive force is a spring. A maritime chronometer is a watch of unusual size, constructed and mounted with especial care, for determining longitude at sea. See WATCH; CHRONOMETER.

Historical Development. Among the predecessors of the clock, as time measurers, are the sundial, the clepsydra, or water clock, and the hourglass. (See DIAL; CLEPSYDRA; HOURGLASS.) The clepsydra was a graduated transparent vase, in which water trickled through a hole in the bottom at such a rate that the receding water marked the passage of time. In the hourglass sand was substituted for water. Among Eastern nations a great many curious mechanical devices were introduced into the construction of the clepsydra: the water was made to flow in tears from the eyes of automata; a floating statue, falling with the liquid, pointed to the passing hour, as indicated on the side of the glass; finally, a mechanism was introduced by which the water, as it fell, drop by drop, turned a little wheel, which moved the hands on the face of a dial and so marked the hour. The next step was the construction of a time indicator, whose hands were moved by the action of falling weights instead of that of falling water. When this step was taken and the first true clock constructed is uncertain. Its invention is claimed by many peoples, from the Chinese, 2000 B.C., to the Germans of the eleventh century. Certain it is that clocks were in general use in churches and monasteries throughout the latter part of the Middle Ages, and that these ancient tower clocks were the progenitors of all our modern timekeepers.

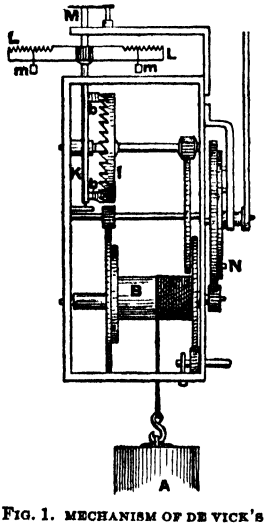


FIG. 1. MECHANISM OF DE VICK'S CLOCK.

The oldest clock of which we have a complete description was set up in the tower of the palace of Charles V of France, in 1379, by a German named Henry De Vick. This primitive clock was constructed on the mechanical principle which is the basis of most modern timekeepers. This principle, as formulated by E. A. Marsh,

is "that the power stored up in a raised weight or coiled spring shall be communicated to a train of wheels which are set revolving, and that the force or motion shall be cut up into a succession of minute but equal impulses by converting a rotary into a vibratory motion. The last and quickest wheel of the train shall have its teeth so formed that they are caught and escape alternately, and hence the wheel is called the 'scape wheel,' and, from its resemblance to a crown, the 'crown wheel.' The bar and staff, which with its projections catch and release the teeth, is termed the 'escapement,' and it is through this device that the rotary is converted into the backward and forward motion." The accompanying sketch of De Vick's clock is useful, not only from its historical interest, but also because, from its comparative simplicity, it will form a groundwork for further explanation of the mechanism of clocks in their more complicated form. It will be readily understood, from a glance at the annexed figure (Fig. 1), that as the weight *A* tends to uncoil the cord and set in motion the cylinder *B* round its axis, the motion will be successively communicated to the various toothed wheels in the figure, and finally to the crown wheel or escapement wheel, *l;* the teeth of which so act on the two small levers or pallets, *b b*, projecting from and forming part of the suspended upright spindle or vertical axis, *KM*, on which is fixed the regulator or balance, *LL*, that an alternating or vibratory instead of a circular motion of the balance itself is the result. The hands of the clock are attached to the wheel *N*, also set in motion by the cylinder *B*. Now, unless there were some check upon the motion, it is manifest that the heavy weight *A* would go rapidly to the ground, causing the wheels to rotate, the balance to vibrate, and the hands to go round with increasing velocity. In order to prevent this rapid unwinding of the clockwork, and adjust it to the more deliberate measurement of time, the balance is, in De Vick's clock, loaded with two weights, *m m;* and the farther these are removed from the axis or spindle, *KM*, the more heavily they will resist and counteract the escapement of the levers and the rapidity of the rotation of the escapement wheel, till the clock be brought to go neither too quick nor too slow.

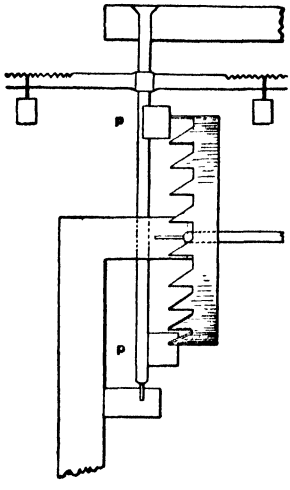


FIG. 2. BALANCE AND ESCAPEMENT OF THE FIRST CLOCK. *p p*, pallets.

Upon this simple plan it is probable that all clocks were constructed until the seventeenth century, when the principle of the pendulum was applied to the science of horology. The property of a pendulum known as its *isochronism* (q.v.) constitutes its value to clock mechanism—that, when a suspended body is swinging, any increase or decrease in its speed will not change the number of vibrations it makes in a given time, but only the length of the arc it describes. This law of the pendulum was discovered by Galileo and was first applied (probably) to clockwork by Huygens, about 1657. The two accompanying cuts show how the horizontal swing of the balance, as maintained in De Vick's clock, was converted into the vertical swing of the pendulum. By taking off one of the weights and hanging the balance in an upright position, it becomes a pendulum. Ten years later Dr. Hooke invented an escapement which enabled a weaker support to carry a heavier pendulum. Subsequent improvements in the escapement and pendulum (see ESCAPEMENT; PENDULUM), and in the use of the spring (see WATCH) in place of the pendulum, have brought the mechanism of timekeepers down to the present degree of perfection.

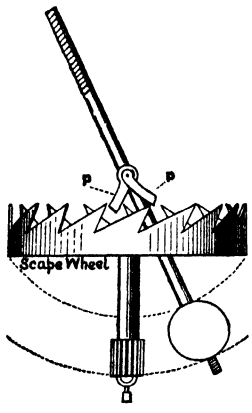


FIG. 3. DE VICK'S OLD BALANCE CONVERTED INTO THE PENDULUM. *p p*, pallets.

Striking Apparatus. The principal function of a clock, according to the mediæval conception, was that it should be a reliable instrument for automatically calling out the hours, particularly the hours for devotion. This conception of the clock is shown in the word itself, which originally meant "bell"—a meaning which has been retained in the French word *cloche*. A striking apparatus was, therefore, early invented, and it is interesting to note that the striking mechanism of De Vick's clock is similar to that used in some modern timepieces. A striking clock contains one or more extra trains of wheels to control the striker. In De Vick's clock 12 pins projected from the wheel on which the hand was attached. At each hour one of these pins, by pushing a lever, released the striking train, which lifted the hammer that strikes the bell. The number of strokes was determined by the position of the notches around the edge of a locking plate, which held the lever controlling the striking train. These notches were so placed that at 1 o'clock the catch in the lever entered a notch as soon as one blow had been struck. At 2 o'clock there was a longer space before the notch was reached, so that the bell was struck twice; at 3 o'clock the bell struck three times before the train was locked, and so on. The chief objection to this striking apparatus is that it is thrown out of order and strikes wrong every time the clock happens to run down.

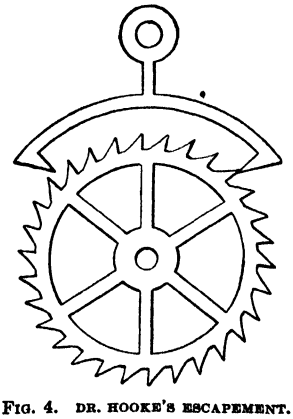


FIG. 4. DR. HOOKE'S ESCAPEMENT.

The *rack and snail repeating mechanism* has been used for over two centuries. It is a peculiar and intricate piece of mechanism. In ordinary clocks the impelling power is a weight similar to that which moves the time-measuring mechanism itself; but the pressure of this weight on the striking machinery is permitted to come into play only at stated periods in course of the workings of the timekeeping apparatus, viz., at the completion of every hour: when the minute wheel, which revolves once in an hour and carries the minute hand of the clock along with it, brings it into action by the temporary release of a catch or detent, permitting the weight wound up on the cylinder of the striking apparatus to run down a little, in doing which the hammer is forced into action, so as to strike the bell. Whether the strokes shall be one or many is determined principally by two pieces of mechanism —one called a "snail," from its form or outline, with 12 steps, and the other a "rack," with 12 teeth. The time during which the striking weight is *allowed* to descend varies according to the turning of the 12 steps of the snail on its axis, and the position of the 12 teeth of the rack at different hours of the day, being sometimes only long enough to permit one blow to be given by the hammer on the bell, and at another time long enough for 12 such blows.

It is not known when the alarm or when the striking mechanism of the clock was first applied. The alarm was adopted for the use of the priesthood, to arouse them to their morning devotions. The first striking clock probably announced the hour by a single blow, as they still do, to avoid noise in churches. During the seventeenth century there existed a great taste for striking clocks, and hence a great variety of them. Several of Tompion's clocks not only struck the quarters on eight bells, but also the hour after each quarter; at 12 o'clock 44 blows were struck, and between 12 and 1 no fewer than 113. Many struck the hour twice, like that of St. Clement Danes, in the Strand, London. Before the fifteenth century chimes had been introduced. See BELL and CHIMES; and consult authorities there cited, especially an article in the *Journal of the Society of Arts* (London, March 29, 1901), on "Clocks, Carillons, and Bells."

Clocks Provided with Automatons. The desire to construct clocks which shall perform automatically many other things besides simply recording the time of day is as old as clock making and was developed to a wonderful degree in the ancient clepsydræ of Oriental nations. Indeed, the automatons of the ancient Chinese and Arabian clocks were the models upon which all those of mediæval Europe, including the famous Strassburg clock, were based. Among the earliest of these automatons or "jacks of the clock" built in the tower clocks of Europe were those of the clocks at Dijon, Cambrai, and Linden, in each of which two figures appear and strike the hourly bell. In 1495 the clock at Lübeck was built in which the figures of the Twelve Apostles were introduced.

Probably the most widely known of these tower clocks is the one in Strassburg Cathedral. This famous clock has been reconstructed twice. The first Strassburg clock was built in 1352, under the direction of John, Bishop of Lichtenberg. It contains a calendar, an astrolabe, and a set of chimes composed of several cymbals. There were automatic figures of the Virgin, of the three Wise Men who bow before her, and a cock, which moves its beak, crows, and flaps its wings. The second Strassburg clock was built in 1570. Its mechanical works were constructed by Isaak and Josias Habrecht, of Schaffhausen, Switzerland. Early in the nineteenth century it was found that the clock required reconstruction, and the task was consigned to Charles Schwilgué, who consumed four years in its completion. Only a few of the original movements were restored by Schwilgué, most of the present mechanism being of his own design.

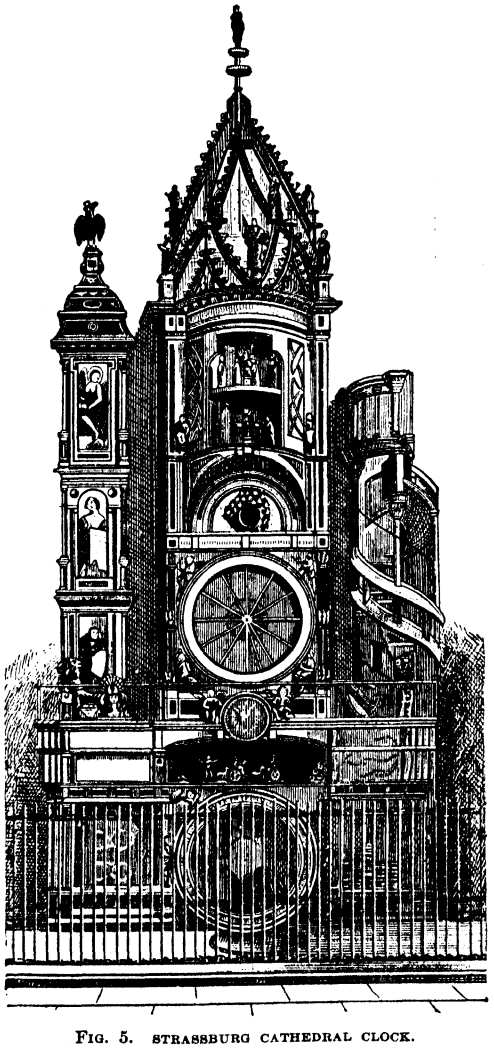


FIG. 5. STRASSBURG CATHEDRAL CLOCK.

The following description of the present Strassburg clock indicates its most important features: It is 30 feet high and 15 feet at the base. On one side of the main portion is a flight of winding stairs, surmounted by five columns. On the other side is a Gothic pillar, the panels of which are filled with figure paintings. At the base of the main portion of the clock is a celestial globe, indicating sidereal time, and showing the rising, passing over the meridian of Strassburg, and setting of all stars that appear above the horizon, visible to the naked eye. Behind the globe is a calendar,

showing the day of the month and the fixed and movable feasts. A statue of Apollo points out the day of the month. The calendar is in the form of an annular band, so arranged as to show many other astronomical events besides the day of the month. Above the calendar are figures drawn in chariots, one appearing each day. On Sunday Apollo appears, drawn by horses of the sun. On Monday Diana, emblem of the moon, drawn by stags, appears. She is succeeded in turn by Mars, Mercury, Jupiter, Venus, Cupid, and Saturn. Above these figures is the dial which tells the time of day. On each side of this dial sits a figure, one of which strikes the quarter hours, and the other holds an hour-glass and turns it every 60 minutes. The next story is devoted to a planetarium, and the next is a globe for showing the phases of the moon. Above this are movable figures, which in succession strike the quarter hour. The first figure is an infant, which strikes the bell with a rattle; the second is a youth; the third an old man; the fourth is a figure of death, which strikes the bell with a bone. In the highest compartment is a figure of Christ. Each day at noon a procession of the Apostles passes before Him; while a cock, perched above, appears and flaps its wings and crows three times.

The clock at Beauvais, France, is almost as wonderful a piece of mechanism as the Strassburg clock. It is composed of 14 different movements, includes 90,000 different pieces, and weighs 35,000 pounds. There are about 50 dials for indicating different astronomical events. The clock is 36 feet high, 16 feet broad, and nearly 9 feet deep.

The clock in Lyons Cathedral is much like the Strassburg clock. The old clock of Prague was built by one Harausch; and so jealous were the citizens of Prague lest he should build a similar clock in some other city—so the story goes—that they put out his eyes. This clock also contains various mechanical figures. The hour is rung by a skeleton, with the bell rope in his hands.

Another monumental clock is that in the clock tower on the Piazza San Marco, Venice. A Madonna sits on a platform between two doors overlaid with gold. When the time for certain religious festivals occurs, an angel comes out from one of these doors, blows a trumpet, bows to the Virgin, and passes out at the other door. The hour is struck by two giants.

Belfry clocks with automatons began to wane in popularity during the seventeenth century, and very few have been constructed since. House clocks with automatons were first made in the fifteenth century; but the height of their popularity was during the Renaissance, when wonderful skill and great artistic talent were expended in their construction. A favorite design for these clocks was that of a ship, whose crew performed numerous automatic functions. Perhaps the most beautiful as well as famous of these automatons is the ship clock of Charles V of France, now in the Cluny Museum. This clock was mounted upon rollers, on which its mechanism caused it to advance and recede. Another favorite design was a mounted huntsman, who at the stroke of the hour moved his head and arms, while the head and tail of the horse also moved. During the eighteenth century clocks with mechanically singing birds were popular. Within recent years automaton house clocks have come to be regarded as interesting examples of mechanical ingenuity and skill, to be occasionally produced and admired, rather than as necessary or desirable articles of furniture.

The United States has produced its share of automaton clocks, though most of them have been smaller than the great tower clocks of Europe. The Rittenhouse clock, made in 1767 by David Rittenhouse, of Philadelphia, has six dials, each marking off different astronomical events. The Columbus clock, made by a citizen of Columbus, Ohio, is 18 feet wide and 11 feet high. Like the clocks already described, this one records many astronomical events; in addition, miniature figures perform various movements. Three towns of Pennsylvania—Donaldson, Hazleton, and Wilkes-Barre—have possessed citizens who have added to their fame by their remarkable clocks.

In 1880 a clock was placed on exhibition in New York that was a striking illustration of the elaborateness to which clockwork may be carried. It was the work of Felix Meyer, who spent more than 10 years in its construction. The clock is 18 feet high, 8 feet wide, and 5 feet deep. It has 2000 wheels, runs by 700-pound weights, and is wound up once in 12 days. When the clock is in operation, it shows the local time in hours, minutes, and seconds; the difference in time at Chicago, Washington, San Francisco, Melbourne, Peking, Cairo, Constantinople, St. Petersburg, Vienna, London, Berlin, and Paris; the day of the week, calendar day of the month, month and season of the year, the signs of the zodiac, revolutions of the earth on its own axis and around the sun; also the phases of the moon and the movement of the planets around the sun. The quarter hour is struck by an infant, the half hour by a youth, the three quarter by an old man, and the hour by death, as in the Strassburg clock. As the hour strikes, a figure of Washington rises from a chair and extends its right hand, presenting the Declaration of Independence. A door is opened by a servant, and all the presidents, as far as and including Hayes, each dressed in the costume of his time, advance across the platform, salute Washington, and retire through another door.

Tower Clocks. As already pointed out, the earliest European clocks were all tower clocks —the house or "chamber" clock being a later invention, closely connected with the invention of watches. Among the early clock builders, ingenuity and complication of mechanism, as displayed in the automatons, was considered of more importance than accuracy as a timekeeper; but within recent years much scientific skill has been used to construct tower clocks which, in spite of their enormous size and great height, with the accompanying atmospheric disturbances at so great a distance from the earth, shall still be accurate timekeepers.

One of the largest clocks in the world is the Westminster clock, in the British House of Parliament, which was put in operation in 1860. Its four dials, situated 180 feet above the ground, are 22½ feet in diameter. Each minute hand is 14 feet long, and the hour figures on the clock are 2 feet long. The pendulum is 13½ feet long and weighs 700 pounds. There are 5 bells, weighing respectively 21 hundredweight, 26 hundredweight, 33½ hundredweight, 78 hundredweight, and 13 tons 11 hundredweight, for striking the first, second, and third quarters and the hour. These bells are hung from massive

wrought-iron framing, in a chamber above the dial. The largest, the hour bell, popularly known as "Big Ben," is 9 feet in diameter and is struck by a hammer weighing 4 hundredweight, which is lifted 9 inches vertically from the bell before it falls. This bell and the great bell of St. Paul's Cathedral are tolled on the death of members of the royal family of Great Britain.

In the Westminster clock, as in all the tower clocks formerly constructed, the mechanism which drives the clock is located in the tower directly back of the face. But in the city-hall clock erected in Philadelphia in 1899 the

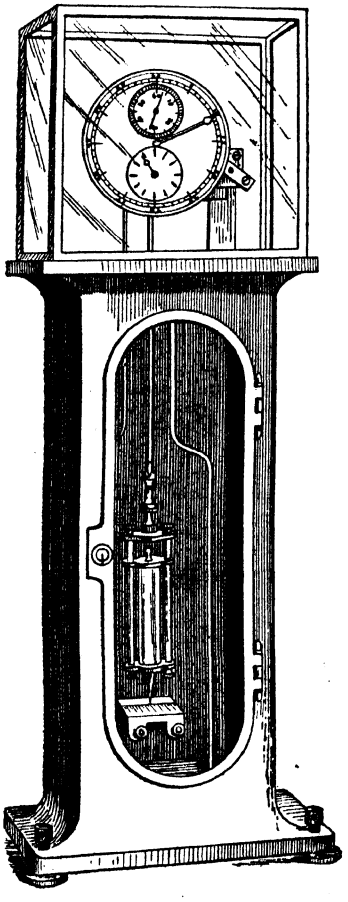


FIG. 6. ASTRONOMICAL CLOCK IN PHILADELPHIA CITY HALL.

clockwork is located in the main part of the building, and is connected with the dial mechanism in the tower by means of compressed air. The whole is based on the fundamental principle of all modern mechanisms—the governing of great forces by comparatively feeble ones. The primary clock is an astronomical clock, constructed with the greatest care, so as to be free from all disturbances from dust, moisture, and vibrations, and is so constructed that without interfering with its delicacy and accuracy it can operate four sets of hands, each weighing 500 pounds. The dials have a diameter of 25 feet. The total height of the tower is 547½ feet, and the centres of the dials are 362 feet above the pavement. The hour hand is 12 feet long and is entirely different in shape from the minute hand, so they never can be mistaken. The face of the dial is made up of several pieces, and the usual numerals are omitted from the face, not being of service at so great a height. The clock was designed by Warren S. Johnson; a detailed description of its mechanism was written by him and published in the *Journal of the Franklin Institute* (Philadelphia) for February, 1901.

The illuminated clock in the tower of the Metropolitan Life Building in New York City represents the most recent achievement in tower clocks, on the score of timekeeping and as an example of mechanical engineering, its extreme size, complication, and various adjuncts introducing many interesting and serious problems. This clock has four dials 26½ feet in diameter, which are placed on the sides of the lofty tower of the Metropolitan Life Building, nearly 350 feet above the street, the very apex of the 700-foot tower being fitted with a lantern by which signals visible over a wide range of territory are flashed for the hours and the quarters. This clock also has a set of chimes (see BELL), giving the Cambridge quarters, which sound the hours and the quarters. The minute hand is 17 feet long and the hour hand 13 feet 4 inches, and the mechanism driving them is controlled by a master clock located in the directors' room and working within an error of five seconds a month. From this clock, which is electrically driven and is of the self-winding type, through transmitters, each independently self-winding and electrically connected to relays and remote-controlled switches, the tower-clock hands, the chimes, and the flashers are all operated as well as the time service of the building. The hands are of steel-frame construction, incased in copper with fronts of wire glass, and carrying 16 incandescent lamps in the minute hand and 10 in the hour hand. Each dial is operated through a worm shaft from an electric motor which is installed in the clockroom on the twenty-sixth floor. The dial numerals are 4 feet high and the minute marks are each 10½ inches in diameter and are illuminated from behind like the figures of a stencil. The clock is so arranged that every quarter of an hour at night the time is flashed from the apex of the tower by red lamps, while white lamps flash the signals for the hour, but remain lighted ordinarily. Fifty-six red lamps and 88 white lamps giving an aggregate of 16,262 candle power are used. At 6 P.M. the chimes are cut out until 8 A.M. of the following day, and at dusk the lighting circuit is switched on. This clock was installed in 1909 and is exceeded in size only by the advertising clock at the Colgate works described below. For further description, consult *Electrical Review* (Chicago, Feb. 19, 1910).

Of a somewhat different nature, but exceeding in size the famous tower clocks described, is a clock erected on the works of Colgate and Company in Jersey City, where it may be seen from the Hudson River and from Manhattan Island. This clock has a dial 38 feet across and an area of 1134 square feet, with a minute hand 20 feet in length which, with its counterpoise, weighs nearly one-third of a ton. The mechanism is moved by a weight weighing 2000 pounds, and the whole clock weighs approximately six tons. This clock serves at night as well as in the daytime; and instead of the usual transparent dial illuminated from behind, the hands are outlined with incandescent lights, and brilliant red lights mark each numeral and an incandes-

cent lamp each minute mark, the latter being spaced 24 inches apart. The face of this clock is of skeleton form, as it was not feasible to expose so large a surface to the action of the wind without such supports that the face would be obscured. The tip end of the minute hand travels 24 inches every minute, or over half a mile a day, and the control mechanism is so regulated that the clock is maintained at a high degree of accuracy.

Electric Clocks. An electric clock is one whose mechanism is, in some way, either actuated or controlled by electricity. There are two principal types of electric clocks—(1) independent clocks, whose mechanism is kept in operation by electricity; (2) systems of clocks which are connected with a central or primary clock by an electric circuit, and are so arranged that either (*a*) the primary clock regulates its movements, at stated intervals, by forcibly moving the hands by an electric current into the proper position, or (*b*) the primary clock directly runs the hands of the secondary clocks, which are simply dials without independent machinery.

Clocks of the first class usually have some electromagnetic attachment applied to the mechanism, which keeps the pendulum in vibration, or their springs or weights constantly wound up; in other words, they are constructed like ordinary clocks, except that they are self-winding. The first self-winding clocks were made as early as 1855 by Alexander Bain, who applied electromagnetic attachments to the bob of the pendulum, which, in obedience to contacts connected with the pendulum itself, attracted it to and fro. Since that time many other means of applying the electric current to keep a clock running have been devised, and hundreds of patents for the same have been taken out. Another form of independent electric clock was put in operation in 1896, in the laboratory of Durham College, North Carolina. The clock is run directly by electromagnets, which are actuated by a current from an earth battery. The pendulum is swung by the electric current, and it is this which moves the clock. The works and dial are placed on the pendulum and swing with it. In addition to the clocks where the electric current gives an impulse to the pendulum, there are those where a spring is wound, or a weight raised, by means of a lever and ratchet working into a fine-toothed ratchet wheel. These clocks may be wound every hour or some lesser interval of time, such as every six minutes.

In the second class of electric clock the object is to keep a system of clocks correct by an automatic connection with a central and standard timekeeper. This method of time service has rapidly extended, until public buildings and private offices are supplied with time from a central clock, just as they receive a common service in heat, light, power, water, etc. Instead of employing the central clock simply as a regulator, it may be adopted as an actual propeller of the clocks on its circuit, and the secondary clocks become mere dials for indicating time, though the modern tendency is to employ self-winding time train clocks with a synchronizing system which often is one of considerable elaborateness of detail. The self-winding clocks can be connected with a continuously charged lighting circuit, thus obviating the necessity for batteries. The master clock for such a system becomes an important consideration, as well as the arrangement of the circuits. Often this time is secured in connection with the great telegraph companies, who receive on their wires the time signals from a national observatory and are enabled to maintain their local master clocks at high accuracy. Certain difficulties have been encountered in the electric connection between the main and secondary clocks, due, among other things, to induced currents from crossed telephone or other electric wires. In view of these difficulties, the Marconi wireless system has been applied to clocks, and the time signals sent out from an observatory can be received and, by means of relays, transmitted to a receiving mechanism. This device, however, has been found more useful for transmitting noon or other specified signals than a regular succession of impulses for continuous timekeeping. Though the general adoption of electrically controlled clocks is a development of the close of the nineteenth century, they have long been the subject of experimentation. In 1837 Alexander Bain began to experiment on electrically driven synchronous clocks, and in 1846 his system was in use between Glasgow and Edinburgh.

Pneumatic Clocks. A system of synchronous clocks which are connected with the central controlling clock by compressed air instead of electricity is called pneumatic. The clockwork in the city hall at Philadelphia, described above, is of this type. Under the influence of a master clock, pulsations of air are sent at regular intervals through the connecting tubes, and cause a bellows to expand at each dial, thus moving the hands.

Astronomical Clocks. An astronomical clock is one built with the simplest and most accurate mechanism possible, and with every possible protection against outside disturbances, so that its movements will be sufficiently accurate for astronomical calculations. The hour hand usually revolves but once a day, the dial being divided into 24 hours. One of the most important considerations for an accurate timekeeper of this class is that it should be maintained at a constant temperature, and often in astronomical observatories rooms are specially constructed for this particular purpose. It will be noticed, from the accompanying cut of the astronomical clock in the city hall at Philadelphia, that the dial has three circles—the minute circle above the centre, the 12-hour circle beneath the centre, and the hour circle upon the circumference of the dial. A clock regulated to keep mean solar or sidereal time is sometimes called an astronomical clock, as is also a clock having a dial on which the movements of the heavenly bodies are shown, this being the earlier application of the term.

A phonographic alarm clock was shown at the Paris Exposition of 1900, and since that time various devices have been developed by means of which the desired time, or any special message recorded on the cylinder, may be spoken when the time set on the indicator is reached. Increasing simplicity has been obtained for these devices, and while they have not attained general use, nevertheless they are available for those requiring them. Night clocks of various designs have been employed by means of which, when a button is pressed, an illuminated image of the hands and dial may be thrown upon the ceiling or wall of a room.

Clock Manufacture in the United States. American clocks were first manufactured in Connecticut, about 1800, by Eli Terry. His

clocks soon became popular, and he continued in business until his death, when his sons succeeded him, under the name of the Terry Manufacturing Company. Many neighboring establishments were soon engaged in clock manufacture, and Connecticut is still the centre of the industry in the United States. According to the census of 1850, there were 1436 clock factories and 2901 watch factories in the United States. At first the movements were constructed of wood, and in the better clocks the pendulum was of wood overlaid with gold leaf. In 1814 Terry invented the "short-shelf" clock, which rapidly displaced the long or hanging clocks previously made. Brass-wheel clocks were not made in the United States until 1837. American manufacturers introduced the system of cutting out the parts from sheet brass with a die, instead of casting them—a method which at once insured greater accuracy as well as cheapness in the product. The adoption of the die and of other forms of automatic machinery in the manufacture of clocks has now been carried to such an extent that nothing is left for the skilled hand laborer but the collocation of the parts. Coiled springs, instead of pendulums, had been used in European clocks for 200 years before their use was introduced into American factories; but they were placed only in the most expensive clocks: the invention of a reliable but cheap steel spring, which could be placed in the least expensive clocks, is due to American enterprise, and its introduction has revolutionized the clock-making industry. The small spring clocks can be manufactured and sold for less than one dollar, and are very popular.

CLOCKS AND WATCHES EXPORTED FROM THE UNITED STATES

(From the Statistical Abstract of the United States for 1913)

YEAR	Watches	Clocks	Total
1891	$ 275,707	$1,304,457	$1,580,146
1892	208,743	1,020,873	1,229,616
1893	241,758	962,423	1,204,181
1894	383,279	919,534	1,302,813
1895	357,329	846,676	1,204,005
1896	530,980	929,395	1,460,375
1897	801,491	968,911	1,770,402
1898	771,912	955,557	1,727,469
1899	819,810	1,043,621	1,863,431
1900	787,620	1,190,074	1,977,694
1910	1,228,713	1,360,218	2,588,931
1911	1,560,870	1,565,901	3,126,771
1912	1,880,677	1,661,468	3,542,145
1913	1,783,249	1,823,008	3,606,257

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CLODD, EDWARD (1840–). An English writer on evolution and allied subjects. He was born in Margate and was educated at Aldeburgh Grammar School. At the age of 15 he went to work and in 1862 became a clerk, and in 1872 secretary of the London Joint-Stock Bank. In 1896 he was for the second time president of the Folklore Society. Besides contributions to English reviews, particularly the *Quarterly* and *Fortnightly*, and to *Hastings Encyclopædia of Religion and Ethics*, he wrote: *The Childhood of the World* (1872); *The Childhood of Religions* (1875); *Jesus of Nazareth* (1880); *Myths and Dreams* (1885; 2d ed., 1891); *Story of Creation* (1888); *Story of Primitive Man* (1895); *Primer of Evolution* (1895); *Pioneers of Evolution* (1897); *Tom Tit Tot—Savage Philosophy in Folk Tale* (1898); *Story of the Alphabet* (1900); *Animism* (1906); and biographies of H. W. Bates (prefixed to an edition of *The Naturalist on the Amazons*, 1892), Grant Allen (1900), and Huxley (1902).

CLŌ'DIA. The infamous sister of Clodius Pulcher (q.v.), and wife of Quintus Metellus Celer, whom she is supposed to have poisoned. She is identified with the Lesbia to whom Catullus addressed his love poems. Her younger sister Clodia married Lucullus, but was put away on account of her conduct. Consult the *Prolegomena* to Ellis's ed. of Catullus, lxiii–lxxii (Oxford, 1889).

CLODION. A French sculptor. See MICHEL, CLAUDE.

CLODIUS PULCHER, klō'dī-ŭs pŭl'kĕr, PUBLIUS. A Roman politician. He first appears in 70 B.C., serving under Lucullus in Asia. In 65 he impeached Catiline for extortion in Africa; but Catiline bribed him and so escaped. Near the close of 62 he was said to have had an intrigue with Pompeia, wife of Julius Cæsar, on the occasion of the celebration of the rites of the Bona Dea (q.v.) in Cæsar's house. Clodius was tried for violation of the sacred mysteries, but was acquitted, it was charged, because he had bribed the judge. Having renounced his patrician status and having been adopted by a plebeian, P. Fonteius, he was elected tribune of the people in 59. One of his first acts was to exile Cicero, who had refused to defend him in the trial for sacrilege; but the great orator was soon afterward recalled in spite of Clodius' opposition. Clodius gathered around him the worst elements of the people, until he became a candidate for the prætorship (53 B.C.) in opposition to Milo. Both candidates worked with reckless energy. The contest was ended in an unexpected manner, Jan. 20, 52 B.C. Milo set out on a journey to Lanuvium. Near Bovillæ he met Clodius, who was on his road to Rome. Both were accompanied by armed followers, but passed each other without disturbance. However, some of the men in the rear guard of each party began to quarrel; a fight followed, and Clodius was killed. See MILO; and consult Cicero's oration, *Pro Milone*, which, however, is polemical and exaggerated.

CLODT-JÜRGENSBURG, klôt-yur'gens-bŏŏrk, PETER KARLOVITCH, BARON (1805–67). A Russian sculptor, born in St. Petersburg. He

studied at the artillery school in that city, was for a short time in the army, and gained his artistic training at the Academy of St. Petersburg, where he was appointed a professor. He was particularly successful in his depiction of horses, especially as seen in vigorous action, and those of the quadriga group on the triumphal arch at St. Petersburg are excellent specimens of this feature of his work. The four colossal groups of "Horse Tamers," in bronze, on the Anitchkov Bridge, St. Petersburg, are also by him. Replicas of two of these are in the grounds of the Schloss in Berlin and in the Piazza del Re, Naples. His son, MICHAEL PETROVITCH (1835–), is a genre painter and etcher of some note. His nephew, MICHAEL KONSTUNTINOVITCH (1832–1902), was a landscape painter, whose works are to be found in nearly all Russian galleries and many private collections.

CLŒLIA, klē'li-ȧ. A maiden given by the Romans as a hostage to King Porsenna. She escaped from the Etruscan camp with some companions, swam the Tiber, and returned to Rome. The Romans, however, bent upon keeping good faith, sent the fugitives back to Porsenna, who, in admiration of this generous action, freed Clœlia and her fellow hostages. A statue was erected in her honor on the Via Sacra.

CLOG ALMANAC. A form of rude calendar, said to be of Danish origin, consisting of a square stick notched for months and days, and showing the saints' days, moon's phases, and other features of the almanac. Specimens are to be seen in the British Museum and other collections.

CLOISONNÉ, klwä'zô'nâ'. See ENAMEL.

CLOIS'TER (from OF. *cloistre*, Fr. *cloître*, from ML. *claustrum*, inclosure, from *claudere*, to close). Strictly, the entire space inclosed by the main encircling wall of a religious establishment (Ger. *Kloster*, monastery), including church, dormitories, and all other buildings. Thus, all the buildings for the body of canons attached to a cathedral were included in the term "cloister." A "cloistered monk" is one living within monastic precincts. But common usage has recently limited the term to those rectangular courts, in the centre of the main group of monastic or canonical buildings, which are surrounded on all sides by a covered arcade. These cloisters were the centres of monastic life; from their arcades the refectory, chapter house, dormitories, and church are reached. In their central open space, or *garth*, are the well and garden. Cathedrals often had their cloisters, especially in England, where many cathedrals were at the same time abbey churches. The cathedral cloister was usually on the south side of the nave. Many large monasteries had more than one cloister; one for the lay brothers, open to all (sometimes in front of the church); one for the monks; a third, smaller, for the abbot. In such great early Benedictine monasteries as St. Gall there was a cloister for the artisans.

The earliest examples of rudimentary cloisters are in Syria; none have survived in the West earlier than the eleventh century. From that time until the fifteenth century Romanesque and Gothic cloisters abound everywhere. With the advent of the Renaissance and the decay of the orders in the fifteenth and sixteenth centuries, they ceased to be built except in Italy.

The general type of cloister is an arcade resting on a high parapet, usually with a single opening in the middle of each side of the quadrangle leading into the central garden; the passage behind the arcade being ordinarily covered with a wooden roof. Above these galleries on one or more sides there was sometimes a second story; in consequence of reconstructions this upper story is very seldom preserved. During the twelfth century the single columns gave way to coupled shafts, slenderer and higher than those of the preceding style. Sometimes, especially in the North, piers supplemented or replaced columns. The cloister followed the changes of style of other buildings. The finest Romanesque cloisters are in southern France and Italy; Germany and England enter the field particularly during the Gothic period; Italy, with few exceptions, furnishes the only fine Renaissance examples. St. Trophime at Arles and Le Puy in Velay are fine examples of French Romanesque cloisters, while those of Thoronet and Silvacanne show the French-Cistercian severity, and those of Fontfroide and Laon show transition to Gothic. In Italy at the same time there was far greater variety and richness. The northern examples at Verona (cathedral), Pomposa, and Bologna (San Stefano) are simple; but farther south the twelfth century developed richer types, as in the Oriental examples at Salerno, Ravello, and Amalfi, and the gem at Monreale (Palermo), with varied columns and mosaic decoration. These were followed by exquisite examples of the Roman school (Fossanova, S. Paolo *fuori le mura*, and the Lateran, Rome). In fact, Rome possesses an unrivaled series, from the heavy cloister of the Tre Fontane and San Lorenzo to the delicate cloister of San Paolo, through all intermediate stages. Gothic cloisters were beautiful everywhere, but the finest specimens are those of the north of Europe, especially France. The pointed arcades are sometimes, especially in England, filled with rich tracery, and the passages behind them covered with groined vaulting. In cooler climates the tracery, sometimes the entire gallery, was glazed. The cloisters of Noyon, Sémur, Soissons—the last named exquisitely rich—of Mont-Saint-Michel (with its novel alternating arrangement of shafts), of Rouen, with a beautiful second story, express the ideas of the golden age of the thirteenth century in France; while those of the fourteenth and fifteenth centuries are inferior, as at Bordeaux and Narbonne. In Germany the most interesting are the Cistercian cloisters, like those of Maulbronn, Altenberg, and Heiligenkreuz. In England, though there are some good early Gothic examples—as at Salisbury—the best are late, as at Gloucester, Hereford, Norwich, Westminster, Wells, and Canterbury. At Batalha and Belem in Portugal are extraordinarily rich cloisters in the overwrought style of the transition to the Renaissance (fifteenth century).

Cloister has a further meaning which concerns the restriction of members of religious men or women to the limits of the inclosure. By ecclesiastical legislation cloistered religious are forbidden to leave their cloister or to admit lay individuals to it. The inmates are not dispensed from this regulation save by the highest authority and only in cases of extreme necessity. The object of this rule is to prevent their being affected by any contaminating influence from outside. They may communicate by letter or even by speech provided in the latter instance

there be a veil and a grating interposing. This applies only to members of cloistered orders, not to all religious communities.

CLOISTER AND THE HEARTH, THE. An historical novel of the time of the early Renaissance, by Charles Reade (1861). The scene is laid chiefly in Holland and Italy.

CLONMEL' (Ir., honey meadow). A municipal borough in County Tipperary, Ireland, built on both banks and on an island of the Suir (Map: Ireland, D 4). Traces of its old walls, demolished by Cromwell in 1650, remain, and it has two Catholic churches, a Franciscan friary, and an endowed school. Among its industries are flour milling, brewing, and tanning. The chief exports are agricultural produce and cattle. Clonmel was an important place in Danish times. In the thirteenth century the Franciscans established universities in the town. Clonmel was the birthplace of Laurence Sterne, the novelist. Pop., 1901, 10,167; 1911, 10,209; nearly one-tenth of the houses are unoccupied.

CLONTARF' (Ir., bull's meadow). A suburb of Dublin, Ireland, about 3 miles east-northeast of Dublin (Map: Ireland, E 3). It is much frequented during the summer months for sea bathing, and there are many handsome villas in the vicinity. At Clontarf, in 1014, Brian Boroimhe (q.v.) met his death while winning a victory over the Danes. Pop., about 5000.

CLŌ'NUS. Rapid flexion and extension due to irregular nerve action in certain diseases of the spinal cord. It is elicited by flexing the foot forcibly and suddenly releasing it.

CLOOTS, klōts, or **KLOOTZ,** JEAN BAPTISTE DU VAL-DE-GRACE, BARON (1755–94). A free-thinking philosopher and republican enthusiast of the French Revolution, generally referred to as "Anacharsis Cloots, the Orator of the Human Race." He was born, June 24, 1755, at Gnadenthal, near Cleves, the son of a German baron of Dutch extraction, and was sent to Paris to be educated when he was only 11 years of age. There he imbibed extremely rationalistic ideas on religion and politics, which were strengthened by a short residence in Berlin, where he came in contact with the Potsdam philosophers, one of whom was his uncle, Cornelius de Pauw. Returning to France at the age of 21, Cloots began the campaign of Reason by an attack on revealed religion and published a curious book, entitled *Certitude des preuves du Mahométisme*—a satirical work, which fell somewhat flat. A visit to England, where he became intimate with Burke, was followed by an extended tour on the Continent. Everywhere he preached his doctrines of liberty, equality, and fraternity, and in several countries he barely escaped imprisonment. From Portugal the news of the outbreak of the French Revolution sent him posthaste to Paris, where he at once began to play an important part. He was instrumental in spreading republican principles in Brittany, and on June 19, 1790, he appeared at the bar of the National Assembly at the head of a throng of Parisians from the slums dressed up in fantastic costume to represent the nations of the earth, and delivered a magniloquent oration in behalf of "Universal Republicanism." To show the sincerity of his principles, he discarded his rank and titles (though not his large income). Cloots was made a French citizen and in 1792 was elected to the National Convention. He voted for the death of the King, "in the name of the human race." He was popular with the visionaries and with the lower orders of Paris, but incurred the enmity and suspicion of Robespierre. In consequence, Cloots was expelled first from the Jacobin Club, and later from the Convention. He was finally arrested in 1794 and after a summary trial was sent to the guillotine, with Hébert and his followers, March 24, 1794. He left a number of works, the chief of which are *L'Orateur du genre humain* (1791) and *Base constitutionelle de la république du genre humain* (1793). Consult: Avenel, *Anacharsis Cloots, l'orateur du genre humain* (Paris, 1865); Bax, *Outlines from a New Standpoint* (London, 1891).

CLOQUET, klō'kā'. A city in Carlton Co., Minn., 27 miles by rail west-southwest of Duluth, on the Northern Pacific, the Great Northern, the Chicago, Milwaukee, and St. Paul, and the Duluth and Northeastern railroads; and on the St. Louis River (Map: Minnesota, E 4). It is an important lumber centre, being especially noted for its large output of white pine, and manufactures print paper and boxes and match blocks. There are municipal water and sewage works, one hospital, and a public library. Cloquet was incorporated as a city in 1903. Pop., 1900, 3072; 1910, 7031.

CLORIDANO, klō'rē-dä'nō. A young Moor, in Ariosto's *Orlando Furioso.*

CLOSE (from OF. *clos,* p.p. of *clore,* to shut, from Lat. *claudere,* to close). A term used in heraldry. When the wings of a bird are down and close to the body, it is described as close. The word is used only with reference to birds addicted to flight. See HERALDRY.

CLOSE, klōs. A space inclosed by a wall or fence; a court, yard, or quadrangle; a narrow side street or passage leading to a court, especially the precincts of a cathedral or monastery. In England, where many of the cathedrals were originally monastic foundations, the entire cathedral property, including fields, cloisters, bishop's palace, chapter house, and ecclesiastical residences, is generally inclosed within a high wall with gates at the abutting streets, the free space within, near the cathedral, being planted with grass and trees: this wide inclosure is termed the close. On the Continent the cathedrals stand in the open, usually in the heart of the city, and thus have no close.

In a legal sense, it is a parcel of land in which some one has an interest, amounting at least to a right to present possession, and which in fiction of law is considered as inclosed by an ideal or invisible, if not real, boundary. Breaking or entering another's close is a trespass. See CURTILAGE; FEE; TRESPASS.

CLOSED SHOP. A shop or other employing enterprise which is restricted to the employment of union labor. Where trade-unions are sufficiently powerful, they seek, as a rule, to incorporate in their agreements with their employers the provision that only union members shall secure employment. The closed shop is commonly denounced by spokesmen of the middle class as a tyrannical institution, a device for securing the aid of the employer to compel men averse to unionism to become members of the organization, or worse still, a means of creating a monopoly for certain favored classes of labor. The spokesmen of labor, on the other hand, assuming that organization is absolutely necessary for the defense of the interests of

labor, urge that there is nothing improper in compelling all laborers in an industry to become members of the organization and share in its burdens. Just complaint, they assert, can only be lodged against the small minority of labor organizations that bar qualified persons from the union and still attempt to enforce the closed-shop rule.

Where the union commands only a part of the trade it is customary to insist that nonmembers shall be excluded only when the union is able to furnish the number of qualified men required. A shop working under such an agreement is known as a preference shop. See TRADE-UNIONS.

CLOSET, klŏ-zĕt′ (OF. *closet*, dim. of *clos*, close). In heraldry (q.v.), the half of the bar.

CLOS'TER-SEV'EN (KLOSTER-ZEVEN). See WILLIAM AUGUSTUS, Duke of Cumberland.

CLO'SURE, or **CLÔTURE**, klō'tŭr′ (OF. *closure*, Fr. *clôture*, from Lat. *clausura*, a closing, from *claudere*, to close). A rule of procedure adopted in the English Parliament, for the purpose of terminating prolonged discussion, and bringing matters under debate to an issue. It had its origin in 1882, when the policy of obstruction adopted by the Irish members made legislation impossible. It was decided then that, at the request of 40 members, the Speaker might declare debate closed, and call for a vote on the question under discussion. As modified in 1887 the rule now stands that the Speaker may cut off discussion at the request of 200 members, or at the request of 100 only, if less than 40 members vote in the negative. In France the clôture has also been frequently used, since the coup d'état of 1851. In the United States House of Representatives, and in the State legislatures, the same object is attained by moving the "previous question."

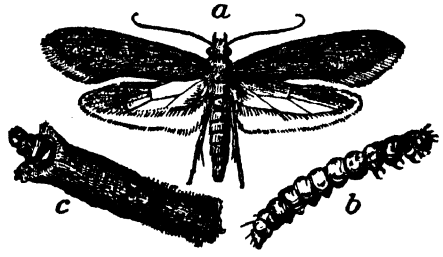
CLOT, klō, ANTOINE BARTHÉLEMY, or CLOT BEY (1793–1868). A French physician, born at Grenoble. He studied at Montpellier, and for several years practiced medicine and surgery at Marseilles. After 1822 he lived mostly in Egypt, where by order of Viceroy Mehemet Ali he established hospitals and medical and pharmaceutical colleges and organized the medical service of the army and navy. In 1832 he was given the rank of an Egyptian bey, and in 1836 that of a general. After the death of Mehemet Ali, Clot left Egypt and resumed the practice of medicine at Marseilles. In 1854 he returned to Egypt, and became physician in ordinary to the Viceroy, Saïd Pasha. Clot's great activity as an organizer did not prevent him from carrying out important scientific observations and gathering large scientific collections. His published works include: *Relation des épidémies de choléra qui ont régné à l'Héggiaz, à Suez et en Egypte* (1832); *Compte rendu des travaux de l'école de médicine d'Abou-Zabel* (1832–33); *De la peste observée en Egypte* (1840); *Coup d'œil sur la peste et les quarantaines* (1851); *Méhémet-Ali, Vice-roi d'Egypte* (1862); *De l'ophthalmie, du trichiasis, de l'entropion et de la cataracte observés en Egypte* (1864); and *Un dernier mot sur la non-contagion de la peste* (1866).

CLOTAIRE, klō'târ′, **I** and **II**. See MEROVINGIANS.

CLOTBUR. See COCKLEBUR.

CLOTH. See WOOLEN AND WORSTED MANUFACTURES; WEAVING.

CLOTHES MOTH. Any of several small moths of the genus *Tinea*, the larvæ of which feed on woolen fabrics and furs. In the United States the depredations wrought by clothes moths, or "moth," are caused by at least three different species, which differ both in structure and habits. One (*Tinea pellionella*) is a small brown moth, with darker brown spots on the fore wings, whose larvæ live within a case composed of bits of the food material bound together with silk. As the larvæ increase in size, the silk cases are lengthened, and when the case becomes too narrow it is split open and a new part is inserted, as may be demonstrated by changing the caterpillar from time to time to differently colored materials. The larva of another, the carpet moth (*Tinea tapetzella*), lives within a winding gallery made up of bits of carpet or other cloth held together with silk. Its fore wings are blackish and yellowish white; the hind wings and head are dark gray. The straw-colored species (*Tinea biselliella*) has a naked larva that spins a little silk over its food material, but makes neither a case nor a gallery. When ready to pupate a cocoon is spun, which, like the larval cases of the foregoing, is composed of fragments of cloth bound together by silk. In the spring or early summer woolen clothes and furs should be thoroughly brushed and subjected to direct sunlight. They should then be carefully packed away in cloth bags or tight boxes, together with naphtha balls or tobacco leaves. Tarred paper and plenty of newspapers are useful for wrapping up rugs. Bits of camphor wood or cedar are also helpful in keeping out moths. A few drops of carbon bisulphide allowed to evaporate in a tight compartment containing infested goods will kill moths and eggs; but as it is very inflammable and the fumes are injurious to man, it should be used with caution. Benzine and gasoline are also useful but rather dangerous moth killers, and printer's ink is poisonous. The best preventive for rugs, etc., is constant use and "kicking about"; for small garments and furs, inclosure in tight cloth bags. Consult Howard, "Household Insects," in *Department of Agriculture, Bulletin 4* (Washington, 1902).



CLOTHES MOTH.
a, The moth; *b*, feeding larva; *c*, pupa in case.

CLO'THO (Lat., from Gk. Κλωθώ, *Klōthō*, the Spinner, from κλώθειν, *klōthein*, to spin). One of the three Fates. See PARCÆ.

CLOTIL'DA, SAINT (c.474–545). A daughter of Chilperic, King of Burgundy, and wife of Clovis, King of the Franks. She was married to Clovis (q.v.), who through her influence was converted to Athanasian Christianity in 496. After the death of Clovis Clotilda took some part in public affairs until two of her grandsons were murdered by their two uncles,

her sons. Then she retired to Tours and practiced the austerities of a devotee until her death. She was buried beside her husband in the church now called St. Geneviève, which she had built in Paris, and, although never authoritatively canonized, was soon recognized and venerated as a saint. There is a statue of her in the Luxembourg, and a fine church in her honor was built in Paris in the middle of the nineteenth century. Consult Kurth, *Sainte Clotilde* (Paris, 1905).

CLÔTURE. See CLOSURE.

CLOTZ, MATTHIAS. See KLOTZ.

CLOUD, THE. One of Percy Bysshe Shelley's best-known poems (1820).

CLOUD (AS. *clūd*, mass of rock, hillock, which a cloud often resembles). In general, anything that obscures the vision through a clear atmosphere, as clouds of dust, smoke, or moisture. The clouds of smoke over cities and from forest fires and the clouds of dust over the plains of India have an important temporary influence on local climate. In meteorology, the terms denote the moisture of the atmosphere precipitated from an invisible state of vapor into minute globular particles that float for a long time in the air. These particles are so small that they cannot descend rapidly through the ordinary atmosphere, even when perfectly still, on account of its viscous resistance or so-called internal fluid friction. The gentlest ascending current or the slight vertical component of a nearly horizontal current suffices to keep the cloudy particles from falling to the ground.

The condensation of the invisible moisture of the air into particles of water cannot be accomplished in the free atmosphere without a decided reduction of temperature; and this may occur in three ways: 1. If air comes in contact with a cold solid, the latter may be covered with dew; but if two masses of warm-moist and cold-moist air come together, a slight condensation and haze or cloud may be formed where they mix with each other. These clouds by mixture have been extensively studied by Brillouin. 2. If moist air is cooled by radiation of heat, the coolest portions will soon fall to the temperature of the dew point, and the vapor therein begin to become visible as a fog; these foggy particles radiate rapidly, thereby increasing the coolness of the air and stimulating the formation of more fog. 3. But the principal method by which cooling is effected in order to form cloud is the process called "dynamic cooling," first expounded by Espy, Kelvin, Reye, and Peslin, and developed in detail by Bezold and Bigelow. Air expands when it is brought under lower barometric pressure; it may be by being pushed up over a mountain, or it may be by rising because of its own buoyancy. In either case the expansion takes place against the adjacent air, and presses the latter to one side. This operation constitutes work done on the resisting air, and work involves the action of some force which, in the present case, is almost invariably the expansive force due to the heat that is latent in the atmosphere, viz., in the air and vapor combined, or the so-called thermal content.

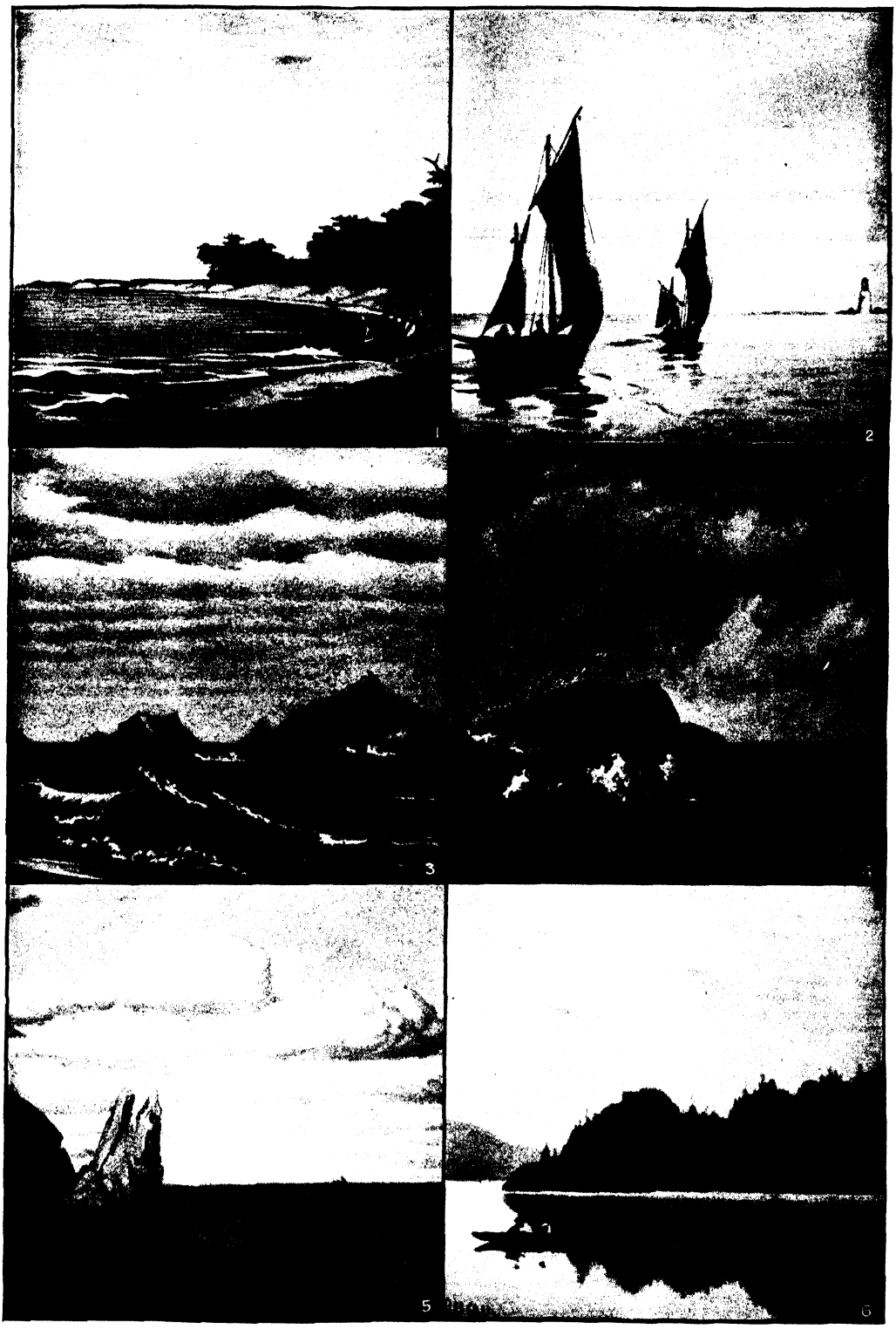
The work done in expansion is said to be done at the expense of the internal heat of the air; or, heat is abstracted from the expanding air in order to do work on the air that is being pushed aside. Consequently, the expanding air grows cool in proportion to the work done. When it is thereby cooled to the dew point, the vapor begins to condense upon dust particles as solid nuclei and forms liquid drops; this involves the giving up of a large amount of heat known as the latent heat of vaporization, which has to be lost by radiation from the drop, wherefore the cooling of the mass becomes much slower. In this process of condensation a given amount of cooling requires a much larger amount of expansion, and therefore of work done, than in the previous stage before cloudy condensation began. This stage is illustrated in the formation of the cumulus clouds seen with showers or thunderstorms or especially in hail weather. On these occasions the cumulus clouds grow rapidly upward to great heights. The upper parts of these clouds can be at such a low temperature as to contain snow or hail in place of water particles. The forms and the quantities of clouds, the direction and velocity of their movements, the apparent changes they undergo, and many other peculiarities have for a century past formed an item of increasing importance in the study of meteorology.

The first step towards simplifying and harmonizing the old meteorological records was taken by Luke Howard, in 1802, in his proposed classification of clouds into three primary forms (*cirrus, cumulus, stratus*), and three intermediate forms (*cirro-cumulus, cirro-stratus,* and *cumulo-stratus*), and these have been almost universally adopted by modern observers; but experience has shown that they do not give a

MEAN HEIGHTS AND VELOCITIES OF CLOUDS AT WASHINGTON, D. C., APRIL, 1896, TO MARCH, 1897

NAMES	MEAN HEIGHTS		MEAN VELOCITIES		EXTREME HEIGHTS	
	April to September	October to March	April to September	October to March	Maximum	Minimum
	Meters	Meters	M. P. S.	M. P. S.	Meters	Meters
Cirrus	10,358	9,511	30.3	34.9	17,182	5,354
Cirro-stratus	10,620	9,526	26.9	30.4	16,144	5,142
Cirro-cumulus	8,826	7,413	23.4	33.4	15,411	3,067
Alto-stratus	5,772	4,801	17.6	21.3	15,552	1,613
Alto-cumulus	5,030	3,822	16.5	21.1	10,167	1,524
Strato-cumulus	2,870	2,399	10.5	15.1	7,285	1,375
Nimbus	1,926	1,804	8.5	11.9	4,022	634
Cumulus, dome	3,068	2,855	...	...	.....	.....
" top	1,819	1,694	7.0	10.9	5,242	545
" base	1,182	1,198	...	...	.....	.....
Cumulo-nimbus, top	4,965	3,730	15.3	21.1	15,903	1,249
" " base	1,750	...	...	...	.....	.....
Stratus	838	1,132	6.0	10.5	.....	.....

TYPICAL CLOUD FORMS



1. CIRRUS.
2. CIRRO-CUMULUS.
3. STRATO-CUMULUS.
4. NIMBUS.
5. CUMULUS.
6. STRATUS.

sufficient range of terms to enable one easily to classify and describe all the varieties of clouds that are to be observed. Probably no simple system of nomenclature would suffice to do this, and Cleveland Abbe has proposed for special students a system of symbols based on the methods of formation of the various kinds of clouds. The many other modifications and new terms that have been suggested are well compared and discussed in a memoir by H. H. Clayton, of the Blue Hill Meteorological Observatory, near Boston, Mass. Consult *Annals of Harvard College Obscrvatory.*

The descriptive abbreviations and classification introduced by the International Meteorological Congress, held at Munich in 1891, is that which is now adopted more or less completely by all the national weather bureaus. Systematic observations upon the heights and movements of all clouds were made at many stations throughout the world in concert from May 1, 1896, to July 1, 1897. From these observations a general idea of the heights of the respective kinds of clouds may be gathered, as shown in the preceding list, compiled from Professor Bigelow's *Report on International Cloudwork of the United States Weather Bureau,* page 20. The titles and descriptions of the clouds are as used by the International Committee.

CIRRUS (*Ci.*). Isolated feathery clouds of fine fibrous texture, generally brilliant white, frequently arranged in bands which spread like the meridians on a celestial globe over a part of the sky, and converge in perspective towards one or two opposite points of the horizon. (In the formation of such bands cirro-stratus and cirro-cumulus often take part.)

CIRRO-STRATUS (*Ci. S.*). Fine whitish veil, sometimes quite diffuse, giving a whitish appearance to the sky, and called by many "cirrus haze," and sometimes of more or less distinct structure, exhibiting tangled fibres. The veil often produces halos around the sun and moon when seen through it.

CIRRO-CUMULUS (*Ci. Cu.*). Fleecy cloud. Small white balls and wisps, without shadows, or with very faint shadows, which are arranged in groups and often in rows.

ALTO-CUMULUS (*A. Cu.*). Dense fleecy cloud. Larger whitish or grayish balls, with shaded portions, grouped in flocks or rows, frequently so close together that their edges meet. The different balls are generally larger and more compact (passing into strato-cumulus) towards the centre of the group, and more delicate and wispy (passing into cirro-cumulus) on its edges. They are very frequently arranged in lines in one or two directions.

ALTO-STRATUS (*A. S.*). Thick veil of a gray or bluish color, exhibiting in the vicinity of the sun and moon a brighter portion, which, without causing halos, may produce coronæ. This form shows gradual transitions to cirro-stratus; but, according to the measurements made at Upsala, was of only half the altitude.

STRATO-CUMULUS (*S. Cu.*). Large balls or rolls of dark cloud, which frequently cover the whole sky, especially in winter, and give it at times an undulated appearance. The stratum of strato-cumulus is usually not very thick, and blue sky often appears in the breaks through it. Between this form and the alto-cumulus all possible gradations are found. It is distinguished from nimbus by the ball-like or rolled form, and because it does not tend to bring rain.

NIMBUS (*N.*). Rain clouds. Dense masses of dark, formless clouds, with ragged edges, from which generally continuous rain or snow is falling. Through the breaks in these clouds there is almost always seen a higher sheet of cirro-stratus or alto-stratus. If the mass of nimbus is torn up into small patches, or if low fragments of cloud are floating much below a great nimbus, they may be called *fracto-nimbus* (the "scud" of the sailors).

CUMULUS (*Cu.*). Woolpack clouds. Thick clouds, whose summits are domes with protuberances, but whose bases are flat. These clouds appear to form in a diurnal ascensional movement, which is almost always apparent. When the cloud is opposite the sun, the surfaces which are usually seen by the observer are more brilliant than the edges of the protuberances. When the illumination comes from the side, this cloud shows a strong actual shadow; on the sunny side of the sky, however, it appears dark, with bright edges. The true cumulus shows a sharp border above and below. If often torn by strong winds, the detached parts (*fracto-cumulus*) present continual changes.

CUMULO-NIMBUS (*Cu. N.*). Thundercloud; shower cloud. Heavy masses of clouds, rising like mountains, towers, or anvils, generally surrounded at the top by a veil or screen of fibrous texture ("false cirrus"), and below by nimbus-like masses of cloud. From their base generally fall local showers of rain or snow, and sometimes hail or sleet. The upper edges are either of compact, cumulus-like outline and form massive summits, surrounded by delicate false cirrus, or the edges themselves are drawn out into cirrus-like filaments. This last form is most common in "spring showers." The front of thunderstorm clouds of wide extent sometimes shows a great arch stretching across a portion of the sky, which is uniformly lighter in color.

STRATUS (*S.*). "Lifted fog" in a horizontal stratum. When this stratum is torn by the wind or by mountain summits into irregular fragments, they may be called *fracto-stratus.*

In general the cirrus, cirro-stratus, and cirro-cumulus are the highest and swiftest; the alto-stratus, alto-cumulus, strato-cumulus, and cumulo-nimbus are median, the nimbus, cumulus, and stratus are lowest and slowest. These three groups are also generally distinctive as to their appearances and methods of formation.

There are some rarer forms of clouds that have received special or local names, such as the following: *Phosphorescent,* sometimes called iridescent, opalescent, or luminous night clouds. These are seen even at midnight in Europe as distant, pure white clouds, near the horizon. Measurements appear to show that they are from 10 to 20 miles above sea level; they may possibly be self-luminous or phosphorescent, but it is more likely that they shine by reflecting the light from a distant twilight. *Hoods,* or false cirri, envelope a mountain top, or the summit of a cumulus dome. These are formed in the air that is pushing upward over the obstructing mountain. The *tablecloth* of Table Mountain at Cape Town is formed somewhat like the hood, but covers the whole flat top of the mountain and hangs down a little way over the leeward cliffs with frayed edges as the cloud matter evaporates back into invisible moisture.

The *helm cloud* and *helm bar* are stationary clouds, formed at the summits of standing waves of air. When an east wind blows over the

Crossfell Range, in Cumberland, England, there is formed not merely a cloud or hood or helmet with rain at the summit of the range, but a series of undulations to the leeward, one or more of which may rise high enough as a standing wave to form a cloud at its summit; through this cloud, in fact, the wind is blowing, and the cloud particles formed on the windward side are carried up through the cloud and down again on the leeward side, evaporating and disappearing as they descend at about the same level as when they were formed on the windward side. *Tornado cloud* and *waterspout cloud* are the distinctive, cloudlike form that reaches down nearly to the surface of the earth or ocean from the main cloud mass above and marks the central axis of a whirling mass of air. Within such a whirl, the barometric pressure is reduced by reason of centrifugal force, and any air that is drawn inward expands, cools, and forms cloud, just as it would do if it rose upward into regions of lower pressure. When the whirl ceases, the cloud immediately disappears. *Globo-cirrus* is a cirrus cloud having a globular form, from which stream downward fibres or filaments, as though the particles of the globular mass were being pulled out by the wind, or were settling down by their own weight into air currents of a different velocity horizontal. *Mammato-cumulus* shows protuberances or pockets on the underside of an otherwise flat-bottomed cloud, as though the heavier portions of the cloud were settling down in groups from the main cloud.

The study of the movements of the clouds is our principal source of information relative to the general motion of the air at considerable heights above the sea or land. During the past fifty years an increasing amount of attention has been given to this matter, and the use of the nephoscope and photogrammeter has greatly increased the accuracy of observation. By international agreement, special observations were made in many countries in 1896 and 1897, the results of which were published in 1898–1901; of these reports the most important is that by Prof. F. H. Bigelow, published in the *Annual Report* of Prof. Willis L. Moore, chief of the United States Weather Bureau. More recently, Professor Hildebrandsson published a general report based on the international observations of clouds, which is translated in the *Quarterly Journal of the Royal Meteorological Society* for October, 1904. Consult Clayden, *Cloud Studies* (London, 1905).

The average area covered by clouds, taking the globe as a whole, is about one-half of its surface. They, therefore, play a very important part in the distribution of solar heat over the earth's surface and within the atmosphere, and the consideration of this influence alone is a very important but difficult problem in the determination of the motions of the atmosphere. See DEW; EVAPORATION; NEPHOSCOPE; RAIN; SNOW.

CLOUD'BERRY (ME. *cloud*, mass of rock, hill, AS. *clūd*, round mass, mass of rock + *berry*) (*Rubus chamæmorus*). A plant of the same genus with the dewberry, which it resembles. It has a trailing habit of growth, and never attains a height of more than 8 to 10 inches; the leaves, few, large, lobed, and somewhat kidney-shaped; the flower large and white, male and female flowers on separate plants, the female plant producing an amber-colored fruit equal in size to a dewberry, and of an agreeable flavor. It is a native of the northern parts of Europe, Asia, and America. In Great Britain it is chiefly confined to elevated moors; in Norway and Sweden it is much more abundant, and the fruit is highly valued and made into excellent preserves. In America it is found only sparingly south of the Canadian boundary, but it is common and greatly prized in Newfoundland, Labrador, Nova Scotia, and northern Quebec. It is abundant through northern Canada, extending from the Atlantic to the Pacific and north to the Arctic circle. The plant is of difficult cultivation, and no attempt to make it produce fruit freely in our gardens has yet been successful. Somewhat similar to the cloudberry is *Rubus geoides*, which yields a very agreeable fruit, as large as a raspberry, one of the few native fruits of Tierra del Fuego and the Falkland Islands. See Plate of RUBUS.

CLOUD'BURST'. A term first applied in the United States about 1840, and in India about 1860, to a sudden extraordinarily heavy local rain. No definite rate or amount of rainfall, or area covered by it, has been assigned as a limit proper for distinguishing cloudbursts from ordinary heavy rains. Many special cases of cloudbursts have been described in English and American meteorological journals, especially in the *United States Monthly Weather Review*, from which it may be seen that the term is rarely used unless six or more inches of rain fall, and at the rate of 10 or more inches per hour. Thus, in one case, 10 inches fell in an hour; in another, the extreme case, 21 inches. Nothing definite is known as to the areas covered by these heavy rains; but it is not likely that the heaviest cover more than an acre, or that the lighter ones cover more than a square mile. Several cloudbursts have occurred on the eastern slope of the Rocky Mountains; but the great rains that cause the heavy floods along the eastern slope of the Appalachians from Georgia to Pennsylvania sometimes attain the intense local character that is ordinarily attached to the term "cloudburst." Professor Ferrel has explained how a mass of water can be held within the cloud by means of rapidly ascending currents; but there is scant evidence of the actual existence of the strong ascending wind required by this explanation, and it seems equally possible that cloudbursts may result from the sudden formation of a large mass of rain in a very tall cloud, rather than from the gradual accumulation of rain in the clouds. Consult: Ferrel, *Recent Advances in Meteorology* (Washington, 1886), and his *Popular Treatise on the Winds* (New York, 1889); Hann, *Lehrbuch der Meteorologie*, pp. 361–370 (1st ed., Leipzig, 1901).

CLOUD ON TITLE. An apparent defect in the title to real estate, based on a written instrument, judgment, or order of court, which purports to create an interest or lien in or an incumbrance upon the land in question. The person whose land is so affected may have the "cloud" removed by appropriate proceeding in equity, instituted by a bill in the nature of a bill to quiet possession, known specifically as a "bill to remove cloud on title." The judgment of the court may direct the obnoxious instrument to be delivered up and canceled, or the record of such incumbrance or lien canceled, or may by decree declare a judgment, order of court, or proceedings under an invalid tax levy, to be void and of no effect so far as the land in question in concerned.

In order to obtain this remedy, however, the instrument or act purporting to create the cloud

on title must have apparent but not real validity. A deed or mortgage void upon its face does not create a cloud, and cannot be attacked by such a proceeding. See BILL IN EQUITY; INCUMBRANCE; TITLE; and consult the authorities referred to under the last-mentioned reference.

CLOUDS, THE. The most famous of the comedies of Aristophanes (q.v.).

CLOUET, klōō'ā'. A family of distinguished French painters of Flemish descent. Jean (?–1540), called Janet, was probably the son of the painter Michele Clouet of Valenciennes. He came to France from Flanders in 1516, and settled at Tours, where he was appointed court painter and valet de chambre to Francis I; later he lived in Paris. He painted a few religious pictures, but his principal works are portraits. Those of the mathematician Finé and the humanist Budé are indisputably authentic, and probably also the 130 drawings in the Musée Condé, Chantilly—a unique collection of portraits of Francis I, his family and court. It follows that the portraits in oil after these drawings, viz., those of Francis I (Louvre and Uffizi), the Dauphin Francis (Antwerp), the miniature of the Duc de Brissac (Morgan collection), and others, are also by his hand. Jean is a product of the Flemish school and was a greater technician than an artist. His portraits are full of life and charm, the drawing is delicate and effective, but the color is cold and thin.—FRANÇOIS, also called JANET (before 1522–1572), the son and pupil of Jean, was born at Tours and succeeded his father as court painter to Francis I, holding the same position under Henry II, Francis II, and Charles IX. There are numerous allusions in the court documents testifying to his honorable position, and from them we learn that he molded the wax death masks of Francis I and Henry II. He was celebrated in verse by Ronsard and in prose by Pasquier. Only two signed portraits by him survive—Pierre Cutte (1562, Louvre) and a "Lady in the Bath" (Cook collection, Richmond); but critics are agreed that he drew a series of 50 colored crayon portraits of Henry II, Francis II, and Charles IX, with their families (Bibliothèque Nationale, Paris). Among the oil portraits attributed to him are full lengths of Henry II (Uffizi), Charles IX (Vienna), Elizabeth of Austria (Louvre), Marguerite de France (Chantilly), and a miniature of Catherine de' Medici (Vienna Museum). Although less subtle than his father, François is a greater artist. His portraits are characterized by unaffected simplicity and precision of execution, and the treatment of form and perspective is admirable. In some of them the influence of the younger Holbein and the Venetian school is plainly visible. There is supposed to have been still another Clouet, a brother of Jean, but of him nothing is known. Consult: Laborde, *La renaissance des arts à la cour de France* (Paris, 1855); Bouchot, *Les Clouets et Corneille de Lyon* (Paris, 1892); Moreau-Nelaton, *Les Clouets* (Paris, 1908).

CLOUGH, klŭf, ARTHUR HUGH (1819–61). An English author. He was born in Liverpool, but when only four years old was taken by his father, a merchant, to Charleston, S. C. He returned to England, however, in 1828, and was at Rugby under Dr. Arnold, whose strenuous appeal to moral responsibility in boys probably had an unhappy effect upon Clough's temperament, naturally high strung, with a tendency to more or less morbid introspection. His Oxford career had an even more decisive influence on his life. He entered the university at the height of the "Tractarian movement," with one of whose most brilliant men, William George Ward, he was intimate. For a time he was carried away by the new current, but the reaction took him further in the opposite direction. He held a fellowship at Oriel College from 1843 to 1848, but relinquished it when it became clear to him that he could no longer subscribe to the religious doctrines involved—becoming later an examiner under the Education Department, like Matthew Arnold, with whom he had much in common. His temperament was essentially skeptical—in no mere negative sense, but in that of reverent and anxious seeking for the truth at all costs. It is this characteristic which dominates the whole of his literary work, whether verse or prose. In his three longer poems, *Dipsychus*, *The Bothie of Tober-na-Vuolich*, and *Amours de voyage*, the analysis of character disturbed by spiritual conflict is the main interest; though he shows a perfect consciousness that the habit of self-analysis and suspense of judgment may be carried too far. After his death, which occurred on a tour in Italy, he was commemorated in one of the noblest elegies in the English language—Arnold's *Thyrsis;* and Lowell (whom, with Emerson, Longfellow, and other eminent men, he had met on a visit to America) expressed the feeling that he would "be thought a hundred years hence to have been the truest expression in verse of the moral and intellectual tendencies, the doubt and struggle towards settled convictions, of the age in which he lived." His *Poems and Prose Remains*, with letters and a memoir by F. T. Palgrave, were published together in 1869, both volumes having been previously more than once reprinted. Another memoir entitled *A. H. Clough: A Monograph*, appeared in 1883. Volumes of selected poems were made by Mrs. Clough in 1894, for the *Golden Treasury Series*, and by E. Rhys in 1896. *Poems*, edited by H. S. Mitford in *Oxford Library of Prose and Poetry*, appeared in 1910.

CLOUS, klous, JOHN WALTER (1837–1908). An American soldier, born and educated in Germany. He came to the United States in 1855, enlisted in the United States army in 1857, and served until 1862, when he was appointed second lieutenant of the Sixth Infantry. He fought in the Civil War, and greatly distinguished himself at Gettysburg, and for this he was brevetted first lieutenant and captain. He was made a captain in the Thirty-eighth Infantry in 1867, and from 1868 to 1886 was engaged in frontier service, and became known for his bravery and skill in engagements with the Indians. In 1886 he became major and judge advocate in the United States army, and served until 1890 as assistant to the judge-advocate-general. He subsequently served successively as professor of law at West Point; staff officer to Major General Merritt (1896–98); staff officer to Lieutenant General Miles during the Spanish-American War; brigadier general of volunteers; secretary and recorder of the Commission for the Evacuation of Cuba; deputy judge-advocate-general on the staff of Major General Brooke, and judge-advocate-general. He published a series of *Lectures on Military and Martial Law*. At his own request he was retired, with the rank of brigadier general, May 24, 1901.

CLOUSTON, SIR EDWARD SEABORNE, BART. (1849–1912). A Canadian banker. He was

born at Moose Factory, Hudson Bay, and was educated at the Montreal High School. After a year in the Hudson's Bay Company's service, he joined the Bank of Montreal as a junior clerk in 1865. In 1887 he was promoted assistant general manager, in 1889 acting general manager, and in 1890, general manager, a position he retained until his resignation in 1911. In 1906 he was elected first vice president of the bank, an office he continued to hold until his death. In 1908 he was created a baronet, and in 1911 a knight of the Order of St. John of Jerusalem. He was president or director of a large number of financial and industrial institutions, and was also prominent in charitable work.

CLOVE AND ORANGE. An Elizabethan "Tweedledee-and-Tweedledum," occurring in Jonson's *Every Man Out of His Humour.*

CLOVE BARK. The bark of the wild clove of the West Indies, *Pimenta acris.* Clove cassia, sometimes called clove bark is the bark of *Dicypellium caryophyllatum,* a little-known Brazilian tree, also found in the West Indies. As marketed, clove bark resembles cinnamon cylinders about one-half foot long and about one inch in diameter, consisting of several pieces telescoped together. The bark is usually dark brown, smooth or slightly wrinkled, with a mucilaginous, aromatic, pungent taste, which suggests a mixture of cloves and cinnamon. In medicine it is known as *Cassia caryophyllata,* and is used like, but considered inferior to, cloves. A similar bark is said to be obtained from the *Myrtis caryophyllata* of Linnæus, which grows in Ceylon. The culilawan (sometimes culilawang) of the Moluccas, which is sometimes confounded with clove bark, is derived from *Cinnamomum culilaban.*

CLOVE HITCH. See KNOTTING AND SPLICING.

CLO'VER (AS. *clœfre,* trefoil, of unknown origin), or TREFOIL (*Trifolium*). A genus of plants of the natural order Leguminosæ, suborder Papilionaceæ, containing a great number of species, natives chiefly of temperate climates, abounding most of all in Europe, although about sixty species are indigenous to the United States; some of them very important in agriculture, as affording pasturage and fodder for cattle and as a means for improving cultivated soil. The name "clover" is also popularly applied to certain plants which have compound leaves with three leaflets like the clovers, and also belong to the order Leguminosæ, but which are not included in the genus *Trifolium*—such as sweet or Bokhara clover (*Melilotus*), bur clover (*Medicago*), prairie clover (*Petalostemon*), bird's-foot clover (*Lotus*), and a number of others. The true clovers (*Trifolium*) have herbaceous, not twining, stems; roundish heads or oblong spikes of small flowers, the corolla remaining in a withered state till the ripening of the seed; the pod inclosed in the calyx, and containing one or two, rarely three or four, seeds. About 17 species belong to the flora of Great Britain. The species of most importance to the farmer is the common red clover (*Trifolium pratense*). (For illustration, see Plates of DICOTYLEDONS and Plate of BLOODROOT with article SANGUINARIA.) This is native to America and most parts of Europe, growing in meadows and pastures. It stands in the front rank of forage plants for good yields, nutritive value, and adaptability to various climates and soils. It is a perennial, but is generally treated as if it were a biennial. Its heads of flowers are oval or nearly globular, very compact, about an inch in diameter, purple, more rarely flesh-colored or white; the tube of the calyx is downy; the stipules run suddenly into a bristly point. The leaflets have very often a whitish horseshoe mark in the centre. It is supposed that clover found its way into England from the Netherlands about the time of Queen Elizabeth; but it was not until the close of the eighteenth century that it was introduced into Scotland, where it is now universally prevalent. Perennial red clover (*Trifolium pratense perenne*) is a somewhat hardier form than the ordinary forms of common red clover and of longer duration, lasting for two years or more. The zigzag clover (*Trifolium medium*), also called meadow clover, marl grass, and cow grass, much resembles the common red clover, but is easily distinguished by the smooth tube of the calyx, and by the broader, less membranaceous, and gradually acuminated stipules. The stems are also remarkably zigzag, and are more rigid than in *Trifolium pratense;* the heads of flowers are larger, more lax, more nearly globose, and of a deeper purple color, and the leaflets have no white spot. It is a common plant in Great Britain and most parts of Europe, and is also grown to some extent in the United States. White or Dutch clover (*Trifolium repens*) is also a common native of Great Britain, and of most parts of Europe as well as of North America. When a barren heath is turned up with the spade or plow, white clover almost always appears. It is more permanent than common red clover, and it grows on nearly all soils, but its yield is small. White clover is seldom grown alone, but usually in mixtures of grasses and other clover. The flowers of all kinds of clover are the delight of bees, but those of white clover perhaps particularly so. Alsike or Swedish clover (*Trifolium hybridum*), a perennial, generally regarded as an intermediate form between the common red clover and the white clover, was introduced into Great Britain from the south of Sweden in 1834. It is also common in other European countries and in North America. Crimson clover, or Italian clover (*Trifolium incarnatum*), an annual, native of the south of Europe, with oblong or cylindrical spikes of rich crimson flowers, is much cultivated in continental Europe, and is also quite extensively grown in some parts of England and the United States. Moliner's clover (*Trifolium molineri*) very much resembles crimson clover, but is biennial and has pale flowers. It is cultivated in Europe. Alexandrian clover, berseem, or Egyptian clover (*Trifolium alexandrinum*), an annual species, a native of Egypt, universally cultivated in its native country, where it is the principal fodder for cattle, is supposed to be one of the best kinds of clover for warm climates —such as, for instance, the southern United States. It has oval heads of pale yellow or whitish flowers. Yellow clover, or hop trefoil (*Trifolium procumbens*), is common in dry, gravelly soils, but is not much esteemed. It has smaller leaves and flower heads than has any of the cultivated species. The flowers are yellow, and the heads resemble miniature hop strobiles.

Clovers are of great value to agriculture, on account of the many different ways in which they may be utilized. Clover is fed as hay, as

green fodder, and as silage, and it is used for pasturage, for green manuring, and as a cover crop. It is chiefly valuable as a means of enriching the soil, being capable of appropriating free nitrogen from the air by means of its roots. It has long been recognized that clover growing has a beneficial effect on the soil; but this phenomenon was not understood until about 1888, when scientists discovered that leguminous plants, through the agency of bacteria living in the characteristic tubercles or nodules on the roots, take up free atmospheric nitrogen. In the soil this nitrogen is oxidized to nitric acid, which forms nitrates, and in this form the nitrogen is assimilated by growing plants. In addition to their power of taking up free nitrogen, clovers are very valuable because of the large and deep development of their root systems, which effects a marked improvement in the physical condition of the soil, and thus indirectly increases its fertility. Plowing clover under for green manure is a most effective method of adding humus to the soil. Crimson clover is recommended in the United States as a cover crop for orchards, to be sown late in summer when the soil is no longer cultivated, and to be plowed under the following spring. In this way the soil is kept moist, its surface is kept from hardening, and much available plant food is afforded the trees for the following season's growth. In general, the common red clover is the most important in the United States. Consult: *United States Department of Agriculture, Farmers' Bulletin No. 455, Red Clover; No. 550, Crimson Clover;* Thos. Shaw, *Clovers and How to Grow Them.*

Feeding Value.—On an average red clover (green crop) has the following percentage composition: Water, 70.8; protein, 4.4; fat, 1.1; nitrogen-free extract, 13.5; crude fibre, 8.1; mineral matter 2.1. Red-clover silage contains—water, 72.0; protein, 4.2; fat, 1.2; nitrogen-free extract, 11.6; crude fibre, 8.4; ash, 2.6 per cent. Red-clover hay contains—water, 15.3; protein, 12.3; fat, 3.3; nitrogen-free extract, 38.1; crude fibre, 24.8; and ash, 6.2 per cent. Other clovers and their cured products resemble the above quite closely. Clover forage is relatively highly nitrogenous, is relished by all farm animals, and is capable of replacing in part more expensive concentrated feeding stuffs—such as bran, linseed meal, etc.

Clover is very important for soiling, as it is available early in the season, and is relished.

Pigs do well on clover pasture, building good bone and framework, and fatten rapidly later on when given concentrated feed. Clover is very succulent in the green, uncured state, and therefore, like all such feeds, liable to cause bloat, if too much is eaten. Animals should not be turned on clover pasture when very hungry, or while the dew is on the clover. Some dry fodder should be placed in racks in the pasture, as this is said to relieve bloat.

Clover hay is not usually considered a satisfactory coarse fodder for horses, as the dust it carries proves detrimental. A limited amount may, however, be fed to all kinds of horses, with favorable results. It is a very satisfactory coarse fodder for milch cows. It furnishes the protein essential for milk, and is relished by the animals. By feeding clover hay as one-half to two-thirds of the coarse fodder of a ration, the amount of concentrated feed required may be diminished, and thus the cost of the ration lowered. For calves and young stock, clover hay is very important. No other coarse fodder is superior for sheep.

As shown by experiments with ruminants, the following percentages of the nutrients in red-clover forage are digestible: Dry matter, 66.1; protein, 67.0; fat, 64.5; nitrogen-free extract, 77.6; crude fibre, 52.6; and ash, 55.0 per cent.

Red-clover hay has the following digestibility: Dry matter, 57.4; protein, 58.0; fat, 55.2; nitrogen-free extract, 64.4; crude fibre, 54.2; and ash, 29.1 per cent. In this respect it compares favorably with other coarse-fodder crops, both green and dry.

Clover Diseases.—There are two important fungous diseases of clover—a "rust," and what has been designated as the "clover rot." The rust (*Uromyces trifolii*) is said to have first been noticed in South America, and to have come to the United States by way of Europe, where it is quite destructive. It infests the leaves, leafstalks, and stems, producing definite brown spots. The fungus passes through three phases—the first on the white clover, upon which minute cups are formed, filled with orange-colored spores; the other two phases, red and black (so called from the color of the spores occurring on red clover), are quite destructive. When a portion of a field is found affected, it is best to cover the clover with straw and burn it to prevent further spread. The "clover rot" (*Sclerotinia trifoliorum*) occurs on crimson clover in the United States, although common on red and other clovers in Europe. It also occurs on alfalfa, sainfoin, fenugreek, Bokhara clover, etc. Its presence may usually be noted by all plants being killed in patches a foot or more in diameter. Small black bodies will be seen at the base of the wilted stems in the autumn, followed by the appearance of small mushroom-like bodies in the spring. Burning, as mentioned above, and rotation of crops, are recommended for its suppression. A leaf-spot disease (*Pseudopeziza trifolii*) is sometimes quite destructive to clover and alfalfa. The diseased leaves show on their upper surfaces small black specks, which enlarge and extend through the leaf, destroying it. When present, this disease is liable to become epidemic, causing considerable loss. Burning over fields in autumn and frequent cutting prevent serious loss to the crop. Another destructive parasite of clovers, although not a fungus, is the dodder (q.v.).

CLOVER, RICHARDSON (1846–). An American naval officer, born at Hagerstown, Md. After graduating from the United States Naval Academy in 1867 he was promoted through the various grades, becoming a captain in 1902 and rear admiral in 1907. He had charge of the survey in southeastern Alaska in 1885–86, was hydrographer of the Bureau of Navigation in 1889–93, and chief of the Office of Naval Intelligence in 1897–98. During the Spanish-American War he was in command of the *Bancroft.* In 1906–08 he was president of the Board of Inspection and Survey. He was retired in 1908.

CLOVER BROOM RAPE. See PARASITE, PLANT.

CLOVER BUTTERFLY. See Colored Plate of AMERICAN BUTTERFLIES, with the article BUTTERFLIES AND MOTHS.

CLOVER INSECTS. Various insects injuriously affect cultivated clover, of which the following are prominent: The roots are attacked by borers, and the stems by a gall-making beetle (*Languria mozardi*); also by a cutworm,

the larva of the zebra moth (q.v.). Weevils do great injury to clover in various parts of the plant; the worst species (*Hylesinus trifolii*) is an importation from Europe. These minute beetles pair in early spring, and then the female gnaws a cavity in a root of two-year-old clover and places in it four to six eggs. The larvæ, as soon as hatched, bore along the axes of the roots of the clover, causing the plants to weaken and often to die. Another beetle (*Phytonomus punctatus*), called the clover-leaf beetle, sometimes appears in swarms, coiling about the tips of the leaves. The leaves are also attacked by a midge or gall gnat, and the seeds by another (*Cecidomyia leguminicola*), the latter of which is very destructive. It lays its eggs in the blossoms of red clover in May and June, and these hatch into small reddish or yellowish maggots, which destroy the forming seed. Upon reaching full growth, they wriggle out from the floret and fall to the ground, transforming to pupæ within delicate, spherical cocoons, from which the adults issue the following spring. The larvæ leave the florets just before the time of cutting the first crop of clover for hay, so that if the time of cutting for this crop be advanced two weeks, the insect will be destroyed. Another enemy to the seeds is the greenish caterpillar of a moth (*Grapholitha interstinctana*), which devours florets and seed vessels. The clover-hay worms, caterpillars of pyralid moths, especially *Asopia costalis*, affect particularly stored hay in which clover is mixed.

CLOVES (from Fr. *clou*, from Lat. *clavus*, nail, so called from the shape). The dried flower buds of the clove tree, *Caryophyllus aromaticus*, now *Eugenia caryophyllata*, of the family Myrtaceæ. The clove tree is from 15 to 40 feet high, evergreen, with a beautiful pyramidal head. The flowers are small, but produced in great profusion in cymes. The leaves, flowers, and bark have an aromatic odor. The ripe fruit resembles an olive in shape, but is not quite so large; it is of a dark-red color; it sometimes appears in commerce in a dried state, under the curious name of "mother cloves"; it has an odor and flavor similar to cloves, but much weaker; the broken fruitstalks are sometimes also used for the same purposes as cloves, but the flower buds themselves are the principal product of the tree. They are gathered, and are dried by exposure to the smoke of wood fires, and afterward to the rays of the sun, or by the latter alone. When first gathered they are reddish, but become of a deeper brown color. The unexpanded corolla forms a little round head at the end of the calyx tube which is about half an inch long, and thus the appearance is not unlike that of a little nail, whence the name. The clove tree is a native of the Spice Islands, but is now cultivated in Sumatra, Bourbon, Mauritius, some parts of the West Indies, and elsewhere. For illustration, see Plate of FLAVORING PLANTS. The wild clove tree of the West Indies is *Pimenta acris*. See MYRTACEÆ.

The properties of cloves depend chiefly on an essential oil—oil of cloves—which forms one-fifth or one-sixth of the whole weight, and is used for flavoring dessert dishes and articles of confectionery. The oil of cloves is obtained by repeatedly distilling cloves with water, when two oils pass over, one of which is lighter and the other heavier than water. The oil has a hot, acrid taste, is light yellow when pure, and brown-red when not so carefully prepared. It has a characteristic odor, and is soluble in ether, alcohol, and the fixed oils. When taken internally in small quantities, it has the effect of aiding digestion and of stimulating the appetite. It is sometimes used in medicine as a stomachic, carminative, and antispasmodic, and is often added to scammony and castor oil to prevent the griping that is likely to be caused by those substances. Oil of cloves is further employed in scenting soaps, and by the distiller. The chief constituents of the oil are eugenol, or eugenic acid, $C_{10}H_{12}O_2$, and a terpene, $C_{15}H_{24}$.

CLOVES, OIL OF. See CLOVES.

CLOVIO, klō'vē-ō, GIULIO, properly GIORGIO (1498–1578). The most eminent Italian illuminator of the High Renaissance. He was born at Grizani in Croatia, the son of a Macedonian, and went to Italy in 1516. He was at first employed in designing medals and seals for Cardinal Grimani, then studied at Rome with Giulio Romano, upon whose advice he became a miniaturist. From 1524 to 1526 he practiced his art in Hungaria under the patronage of King Louis II, after which he returned to Rome. At the sack of Rome in 1527 he was taken prisoner by the Spaniards, and upon his release, in accordance with a vow made in captivity, he entered the monastery of San Rufino, assuming the name Giulio in religion. He removed to the house of his order at Padua, which, by reason of ill health, he was allowed to leave; he entered the service of Cardinal Grimani at Perugia. For this prince he painted some of his finest illuminations: those of Grimani's *Commentary on the Epistle to the Romans* (Sloane Museum, London), and the *Book of Hours* in the British Museum, probably also the illuminations of Petrarch's poems in the Biblioteca Trivulziana in Milan. In 1538 he returned to Rome under the patronage of Cardinal Farnesi, for whom he executed his masterpiece, the *Book of Hours of the Blessed Virgin Mary* (now in the library of J. P. Morgan, New York), upon which he is said to have labored nine years. His last years, spent at Parma and Rome chiefly under the patronage of Margaret of Austria, were blighted by a disease of the eyes, and he died at Rome early in January, 1578. Clovio was most extravagantly praised by his contemporaries and was considered the greatest illuminator of all times. His technique was indeed perfect, but, like other artists of the day, he was under the ban of Raphael and Michelangelo, whose compositions were often copied in his miniatures, and he therefore lacked creative originality. His work is unrivaled in neat and sure drawing and charm of color, but the compositions were often overcrowded. Of the many other illuminations ascribed to him, few are certainly authentic. Mention should be made of *Missals*, Nos. 3805 and 3807, in the Vatican, the *Towneley Lectionary* (New York Public Library), the "Crucifixion" (Uffizi), and the miniatures of the manuscripts of poems by Eurialo da Ascoli in the Imperial Library, Vienna. Other attributions are those of the *Lives of the Dukes of Urbino* and Dante's *Paradiso* in the Vatican, besides manuscripts in the British Museum, the Bibliothèque Nationale, Paris, the library of St. Mark's, Venice, etc. Consult: Sakcinski, *Das Leben des Giulio Clovio* (Agram, 1852); Bradley, *Life and Works of Giorgio Clovio* (London, 1871); Bertolloti, *Don Giulio Clovio, principe dei miniatori* (Modena, 1882).

CLO'VIS, CHLODWIG, or CHLODOVECH (c.466–511). A king of the Franks, of the line of the Merovingians. By the death of his father, in 481, he became King of the Salian Franks, whose capital was at Tournai, in what is now the Belgian Province of Hainault. His first achievement was the overthrow, in 486, of the Gallo-Romans under Syagrius, near Soissons, after which he extended his conquests to the Loire. Clovis did not dispossess the inhabitants, as the Franks were only few in numbers, and the public lands were sufficient for them. About 493 Clovis married Clotilda, daughter of a Burgundian prince. Clotilda was a Christian, and earnestly desired the conversion of her husband, who, like most of the Franks, was still a heathen. According to the picturesque account of Gregory of Tours, in a great battle with the Alemanni, in 496, Clovis was hard pressed and, as a last resource, invoked the God of Clotilda, vowing that he would become a Christian if he obtained the victory. The Alemanni were routed, and on Christmas Day of the same year Clovis and 3000 of his army were baptized by Remigius, Bishop of Rheims. Love of conquest concurring with zeal for the Orthodox faith, Clovis marched to the southwest of Gaul against the heretic Visigoth, Alaric II, whom he defeated and slew at Vouillé, taking possession of the whole country as far as Bordeaux and Toulouse. Clovis now took up his residence in Paris, where he died in 511. His great aim had been the subjugation of all the Frankish princes and the union of the whole Frankish people into a single powerful kingdom. The means he employed to secure this end were cruel and unscrupulous; but the end itself would have been beneficial, if he had not frustrated it at his death by redividing the newly organized realm among his four sons, and exposing it to the very perils from which he himself had rescued it. An account of the deeds of Clovis may be found in Gregory of Tours, *Historia Francorum*, bk. ii, ed. by Arndt for the *Monumenta Germaniæ Historica* (Hannover, 1885). Consult also: Junghans, *Geschichte der fränkischen Könige Childerich und Chlodwig* (Göttingen, 1857); Schultze, *Deutsche Geschichte von der Urzeit bis zu den Karolingern* (vol. ii, Stuttgart, 1896); Kurth, *Clovis* (2d ed., Paris, 1901).

CLOVIS. A city and the county seat of Curry Co., N. Mex., 107 miles southwest of Amarillo, Tex., on the Atchison, Topeka, and Santa Fe Railroad (Map: New Mexico, F 4). It contains an Elks Home and a hospital and reading room of the Santa Fe system. The chief industries are dairying and poultry raising. Pop., 1910, 3255.

CLOWES, klouz, WILLIAM LAIRD (1856–1905). An English naval critic, who wrote under the name of "Nauticus." He was born at Hampstead and was educated at King's College, London, and at Lincoln's Inn for the law, which he abandoned for journalism. He served on the *Standard* (1885), *Daily News* (1887–90), and *Times* (1890–95), and contributed largely to English and foreign magazines. His articles on needs of the navy, battleships, torpedo boats, etc., became widely known. He was editor and part author of *The Royal Navy: A History from the Earliest Times to the Present* (7 vols., 1897–1901). Among his numerous works are: *The Naval Pocket-Book* (an annual); *Confessions of an English Hachish-Eater* (1883); *Black America: A Study of the ex-Slave and his Late Master* (1892); *Blood is Thicker than Water* (1894); and a volume of poems entitled *Eclogues* (1899).

CLOWN. See JESTER; PANTOMIME.

CLUB. A word said to be derived from the Saxon *clēofan*, to divide—a club being an association the expenses of which are shared among the members. Societies of somewhat the same nature existed in ancient Greece and Rome, and mention of them is made in Aristotle, Cicero, Plutarch, and other ancient writers. The modern club, however, had its origin in the London taverns and coffeehouses. Thomas Occleve, who wrote in the reign of Henry IV, mentions "La Court de Bonne Compagnie," of which he was a member; but the first celebrated club in London is that to which belonged Shakespeare, Fletcher, Raleigh, Beaumont, and other brilliant men of letters who met at the Mermaid Tavern in Bread Street. Ben Jonson founded a club which met at the Devil Tavern, for which he is supposed to have written his *Leges Convivales*. The Calves' Head, so named in allusion to Charles I, was a famous London club, which existed in the latter part of the seventeenth century and the early part of the eighteenth century, and whose members banqueted on January 31 on a calf's head.

In 1659 the first political club, the Rota, was established and met at the Turk's Head in New Palace Yard. The famous "October ale" was served at the October Club, another political institution, of which Swift became the leading spirit after his conversion to Toryism. The Literary Club, established in 1764 by Sir Joshua Reynolds and Dr. Johnson, of which Goldsmith, Gibbon, Garrick, Burke, and other celebrated men of letters were members, afforded a meeting place for congenial spirits, where they could freely discuss the merits of the contemporary literary productions and their authors. Its membership was limited, and Garrick found it difficult to gain admission. This club still exists in London. It is usually called the Literary Club, but its members have always claimed for it simply the title of "The Club." The King's Head Club, founded by the unscrupulous Shaftesbury, and the Mug House Club, so called on account of the ale mugs used by its members, were noted political clubs of the early part of the eighteenth century. The Kit-Kat, established about 1700, was named after Christopher Katt, a noted mutton-pie man. Its members toasted some celebrated beauty, whose name was inscribed on the toasting glass, in verse. The Dukes of Marlborough and Devonshire, Sir Robert Walpole, Congreve, Granville, and Addison were members of the Kit-Kat. About the same time existed the Tattler's Club in Shire Lane, and the famous Beefsteak Society, whose members wore badges inscribed with the motto "Beef and Liberty." Its members were called "Steaks." Hogarth, Fox, Sheridan, and the Duke of Clarence were among its noted members. As already said, these clubs had their origin in the taverns and coffeehouses of London. To this class belonged Almack's, established in 1764, and White's, established in 1698, as White's Chocolate House, and removed in 1755 to St. James Street. Brooks's was established in 1764, and Boodle's, a famous resort for country squires and hunting men, in 1762.

It is, of course, very easy to understand the

genesis of clubs such as White's and Brooks's. In those days men's personal associations depended chiefly upon party affiliation. Tories lived with Tories, and Whigs with Whigs. Intermarriages between persons of different political families were not common. Hence men flocked to those taverns and public houses where they would meet members of their own party. The next step was easy and obvious. The proprietor would agree, of course for a consideration, to exclude persons whose company would not be agreeable to the habitués of the place. It was thus that White's and Brooks's were formed, White's being a Tory and Brooks's a Whig club. These clubs are known as "proprietary clubs," to distinguish them from those of which the members were the owners. The latter class of clubs is, of course, the more recent.

About 1815, after the termination of the Napoleonic wars, the restaurant or dining room was introduced into the clubs. Many army and navy officers, being no longer needed in active service, were placed on half pay and were thus compelled to observe a strict economy. By combining their resources they could live well and much more cheaply than when having their meals alone. From that time on, the number of clubs in England increased, until at the present day there are more than 100 prominent clubs in London. These may be roughly divided into the following classes: Purely social clubs, to which belong Arthur's (established in 1765), with a membership of 600; the Bachelors' Club (established in 1881), with a membership of 920, admitting ladies as visitors; the Grosvenor (established in 1883), with a membership of 3000; the Junior Athenæum (established in 1864), with a membership of 500; the Piccadilly (established in 1893), with a membership of 1500, admitting ladies as visitors; the Union (established in 1822), with a membership of 1000; the Wellington (established in 1885), with a membership of 1400; the Travellers' Club (established in 1819), with 800 members. To this last club no one may belong who has not traveled for 500 miles in a direct line from London. This rule was made just after the cessation of the Napoleonic wars, during which traveling on the Continent was difficult. Among the clubs whose main purpose is political is the Carlton (established in 1832), which has a membership of 1800 and is Conservative; the Conservative (established in 1840), with a membership of 1300; the Constitutional (established in 1883), with a membership of 6500; the Junior Carlton (established in 1864), with a membership of 2100, and strictly Conservative. The Junior Conservative and the Junior Constitutional have each a membership of 5500 and are Conservative; the Primrose, established in 1886, has a membership of 5000 and is Conservative; the Reform, established in 1837, has a membership of 1400 and is Liberal; the City Liberal, established in 1874, has a membership of 900 and is Liberal.

Among the literary, musical, artistic, and scientific clubs stands out preëminently the Athenæum, founded in 1824 by Sir Walter Scott and Thomas Moore, its members numbering 1200. It is devoted to art, science, and literature. The Press Club, established in 1882, is strictly journalistic; the Garrick, established in 1831, is the home of actors and of the patrons of the drama; the Royal Societies, established in 1894, is composed of 1700 members belonging to the learned associations. The principal clubs patronized by military and naval officers are as follows: The Army and Navy (established in 1837), with 2400 members; and the Junior Army and Navy (established in 1869), with 2000 members, including among them officers of the army, navy, marine, yeomanry, and militia.

The two principal commercial clubs are: the City of London (established in 1832), with a membership of 800, the home of merchants and bankers; and the Gresham (established in 1843), with a membership of 475 and with a like clientèle.

Some of the leading athletic and sporting clubs are: the Alpine (established in 1857), devoted to mountain exploration; the Automobile (established in 1897), with a membership of 1036; the Hurlingham, whose members number 1200, devotees of polo and pigeon shooting. The M. C. C. (Lord's) Club (established in 1787) is the headquarters for cricket and has a membership of 4700; the Prince's Racquet and Tennis (established in 1833), with a membership of 1500, devoted to the practice of these games; the Renelagh, devoted to polo, golf, etc. (established in 1894), with a membership of 1900. The Leander and the Thames are among the principal rowing clubs in England. The New Oxford and Cambridge, composed of the members of those universities, was established in 1884 for the purpose of bringing graduates of those institutions into closer social relations and has a membership of 900; the United University, also composed of Oxford and Cambridge men, has the same aim in view; the University for Ladies (established in 1887) is composed of women educated at universities and medical colleges. These are the principal university clubs of England. The St. James Club, established in 1857, has a membership of 650 and is the rendezvous for diplomats. The Royal Yacht Squadron is the leading yacht club and is a very exclusive institution. These clubs are all housed in buildings that are remarkable for their architectural magnificence and for the completeness of their interior appointments. They combine the comforts of a home and the service of a hotel without the responsibility of the one or the publicity of the other and are conducted at a comparatively moderate expense to the individual members.

Attempts to introduce clubs in continental Europe long met with little success. In Germany such associations were discountenanced by law. The first club established in France in 1782 had politics for its main object and went by the name of "Le Club Politique." There were a number of clubs that played an important part in the French Revolution. The three which are most noted and which exercised the greatest political influence were the Jacobins, the Feuillants, and the Cordeliers. Purely social clubs have also been established in Paris. First among them are the Jockey Club and the Cercle Royal, the most fashionable and exclusive clubs in Paris. The Club de Boston was established in 1885.

In the United States clubs were first introduced in the latter part of the eighteenth century. The Hoboken Turtle Club, organized in 1797, is still in existence. Such a club was, however, of slight importance in the social life of the town. In the city of New York the

pioneer club, in a modern sense, is the Union Club, established in 1836. It is one of the oldest and most exclusive in New York City. Its membership is limited to 1600, and its object is purely social. The Century Club, organized in 1846, has the promotion of art and literature in view. Membership is limited to authors, artists, and amateurs in letters and the fine arts, and must not exceed 1300. The Union League Club was founded in 1863 for the purpose of discountenancing any attempt to impair the integrity of the United States. It has a membership of 1800. The University Club, composed of college and university graduates, was incorporated in 1865. None except degree-holding persons are eligible for membership. Its aim is literary and artistic. Graduates of Columbia, Harvard, Yale, and Princeton universities have large and prosperous clubs. One of the most exclusive clubs in New York, the Knickerbocker, was organized in 1871. Its purpose is purely social. The Lotos Club, organized in 1870, is the home of journalists, authors, artists, musicians, and friends of literature. Resident membership is limited to 500. The Catholic Club of the city of New York has for its primary interest the promotion of Roman Catholic interests in New York and has existed since 1863. The Calumet, a purely social organization, was established in 1879. Its membership is limited to 500. One of the oldest organizations of its kind is the New York Club (social), founded in 1845 and having a membership of 675. The Manhattan Club is a powerful factor in Democratic politics of New York. Its membership is limited to 1500, and it has an actual enrolled membership of 1340. It was organized in 1864, in opposition to the Union League Club. The Reform Club has for its object the promotion of good government and the abolition of the protective tariff. It was organized in 1878. The City Club was founded in 1892 and has a membership of 1300. It is an advocate of honest and efficient municipal government. The United Service Club was organized in 1889 for the promotion of military science. Membership is limited to military and naval officers. The Players' Club was organized in 1888, to promote social intercourse between the different members of the dramatic profession. This club was founded by Edwin Booth, who left the house, with its furniture and pictures, to the association.

The Metropolitan Club, organized in 1891 for social purposes, and popularly known as the Millionaires' Club, occupies one of the most costly buildings of the kind in the world and has a membership of 1400. The New York Yacht Club, organized in 1844, is the most famous body of its kind in America. It occupies a very large and picturesque building and now has a membership of 2325. The New York Athletic Club, which promotes high-class modern sports, was organized in 1868 and has a membership of 4300. The Automobile Club of America, devoted to the advancement and regulation of motoring, was established in 1890 and has 1660 members. The Aëro Club of America, founded in 1906 for the promotion of aëronautics, now has 340 members. The Republican and National Democrat clubs are large and prosperous, representative of the great political parties after which they are named. The Transportation Club has a membership of 800, largely composed of railroad and steamship companies' directors, officials, and agents. It was formed in 1895 for social purposes. The New York Press Club was founded in 1872, as a centre for journalists, and now has a membership of 800. The Lambs' and Friars' clubs are representative of theatrical circles. The former was organized in 1874, and the latter, 30 years later.

Social clubs have also been formed exclusively for women. It would seem that these should have a *raison d'être*, especially in the United States, where ladies' luncheon parties, at which the company of no man is expected or desired, are so popular. Women's clubs are, however, ancient institutions. There were a number of them in ancient Rome, among them an assembly of matrons known as the "Minor Senate." This institution received Imperial recognition. It was chiefly occupied with questions of etiquette—such as the kind of dress that ladies should wear according to their social position; the question as to who might be driven in carriages drawn by horses and who should be compelled to drive mules, whose sedan chairs should have ornaments of ivory and whose of silver; and other weighty problems. The modern ladies' clubs have, therefore, the authority of very ancient example. They would seem to have a reason for existence in the gregarious and social instincts of the sex; but it is probable that the popularity of these clubs has been affected by the admission of ladies to certain of the privileges of the men's clubs—a privilege which renders special clubs for women less necessary.

There is still another class of clubs, such as the Liederkranz and the Arion in New York, the original purpose of which was musical. These clubs have one point of special interest—they are German in their origin rather than English. If the English public house, to which, of course, it was not the custom to admit women, is to be taken as the origin of the typical club of the present day, the German beer garden may be viewed as the origin of such clubs as the Liederkranz and the Arion. The German goes to the beer garden in company with his wife and daughter or his sweetheart; and so, in the modern German clubs of New York, the men are usually accompanied by the women.

It seems to be a recent tendency of clubs, particularly in the United States, to facilitate, so far as is possible, the admission of ladies to club privileges. In many of the clubs it is possible for members to bring ladies to dine—a thing unheard of in England until 30 years ago and at that time scarcely known in America. The Bachelors' Club in London, founded about 30 years ago, admitted ladies as visitors under certain conditions; and that club is one of the most successful in London. Other clubs have been founded which have the same characteristic, but the innovation has not proved so popular in England as in the United States.

The degree to which ladies are to be permitted to share the privileges of men's clubs is becoming an interesting subject. During certain hours the club must, in the nature of things, always remain sacred to men. They cannot have that comfort and unrestraint when ladies are present which they can have by themselves. During the morning hours it is natural that the ladies should be excluded. And there are also many men to whom the presence

of women in the clubs in the evening would not be agreeable. The division of men into those who prefer to spend their evenings in their domestic circle and those who prefer to pass them with other men seems to be inevitable and permanent.

As we have seen, the modern club, originating in England, has spread all over the world. It is necessary, of course, that the club in each country shall have to some extent the characteristics of that country. For instance, in a French club, a newcomer must ask to be introduced to the members of the club, that being, in general, the French habit. His failure to do so would be resented by the members. In England, on the contrary, a man newly admitted would never think of asking to be introduced personally to the members. Certain differences between English and American society appear in the club life of the two countries. In general, it may be said that there is greater sociability in American than in English clubs. Indeed, the ideals of club life in the two countries are, or at any rate were, essentially dissimilar. Early in this century Englishmen found that it was possible for an individual to live at a club for £600 a year as well as he could live at home for £6000. In the club he could have everything that he could have at home except the privacy of his own house. If he could not quite have that, he wished to have something as near it as might be. Hence the original character of the English club was somewhat solitary and unsocial. Another difference between English and American clubs was originally this: The men who founded the great English clubs were either without occupation or at most half employed. The club was, therefore, with them a place to live in and to spend a large part of the day. The American clubs, on the contrary, were originally founded by men fully employed, for purposes of social relaxation. Their early equipment, as a rule, was two or three rooms, where business men could meet outside of business hours and talk. From such a nucleus as this have grown up in our cities the great houses with library, restaurant, billiard rooms, baths, and other appliances of luxurious living.

The present tendency, however, seems to be for English and American clubs to assimilate in character. In England the clubs have extended through all classes of the community, so that in many of them membership consists fully as much of business men as it does in the United States. In the United States, on the other hand, the number of unemployed or half-employed men is growing, so that the men who use clubs as places to live in have greatly increased in number. It is said, by those who are in a position to know, that the sociability which has characterized American clubs has extended to these societies in England and is on the increase among them.

Regarded from a legal point of view, a club may be incorporated or unincorporated; but it is essential to its character as a club that it shall not be instituted for trading purposes and shall not carry on any occupation having gain for its object. Social clubs, as we know them, are of English origin and have usually been unincorporated, the earliest—such as White's, Brooks's, The Beefsteak, and other celebrated resorts in London—being of the proprietary kind, one person furnishing the club premises and all accessories, in consideration of an entrance fee and fixed annual subscriptions, the members being mere licensees and not coproprietors. This type of club still survives in England and has of late become quite common in convivial and sporting circles in New York, Chicago, San Francisco, and other large cities of the United States. Gaming clubs are usually conducted on this principle.

The more usual and familiar type of club at the present time, however, is the "members' club," in which the persons constituting the association are, by virtue of their membership, coöwners of the property of the club and equally entitled to share in its privileges. The legal relation between the members is that of mutual contracting parties, the terms of the agreement creating their mutual rights and obligations being contained in the articles of association and in the rules and regulations adopted thereunder. These articles and rules also fix the powers and determine the authority of the governing board and other officers and committees of the club, each member being bound to submit to such authority by his express or implied assent to the rules and regular proceedings of the club. Every new member becomes a party to the contract of association, whether he formally subscribes to its articles or not, though it is usual to make such subscription.

The proceedings of social clubs have not often come before the courts for review, and when they have, it has usually been in connection with the exercise of the right of expulsion of an obnoxious or offending member. This is generally provided for and regulated by the rules of the club, and, in general, it may be said that any member who brings himself by his conduct within the condemnation of the rules may be expelled in the manner provided by them, or, in the absence of any express provision, by the vote of a majority of its members. But the courts are not blind to the serious consequences of an expulsion, especially in the forfeiture of the property rights which it involves, and will see that the offending member has fair play. He is entitled to a hearing and to reasonable notice, whether the rules of the club provide for it or not. The governing committee is a quasi-judicial tribunal and must act as such. But if the proceedings have been regular and fairly conducted, the courts will usually make no further inquiry. They will not, under ordinary circumstances, undertake to control the discretion of the association or its committee, or to determine what is and what is not proper conduct on the part of a member. Doubtless, however, if it appeared to the court that a member against whom proceedings have been taken was the victim of unreasonable prejudice or of a conspiracy, it might order his reinstatement.

Generally speaking, the individual members of unincorporated clubs are not liable for the debts of the concern, unless they have authorized the transactions out of which such debts arose—a voluntary club not being a partnership and no agency being presumed; but the assent necessary to bind the members individually may be given by resolution under the rules. Of course, where no agency or ratification can be shown, the steward or house committee or other officer making or directing a purchase becomes personally liable upon the

obligation incurred, the club, as such, having no legal status. An incorporated club, however, like any other corporation, may sue and be sued in its corporate capacity; and its officers and members, so long as they have complied with the law, are equally free from individual liability for its debts. For this and other reasons it has become a common practice to incorporate clubs of this character. But incorporation does not involve the existence of a capital stock, in the ordinary sense of that term, nor of corporate shares, nor has a club member usually a transferable interest. (For a remarkable exception to this rule, see STOCK EXCHANGE.) For the dissolution of an incorporated club, legal proceedings are necessary; but a voluntary, unincorporated association may be dissolved informally by mutual agreement of its members, and thereupon the property of the club is distributed equally among them.

Although a club is not a place of public entertainment, i.e., neither a tavern nor a hotel, within the meaning of excise legislation, it may nevertheless be brought by statute under public regulation. Of course, the proprietor of a "proprietary club" is subject to the same laws as any other persons buying and selling intoxicating liquors. It has been held, however, that the furnishing of wine, beer, etc., to a member of a "members' club" is not "giving or selling" liquors within the excise laws. A club may also be a common gambling house under the law if its members in considerable numbers habitually congregate there for purposes of gaming. See CORPORATION; JOINT-STOCK ASSOCIATION; VOLUNTARY ASSOCIATION; and the authorities there referred to. See also BOYS' CLUBS; WOMEN'S CLUBS; WORKINGMEN'S CLUBS; WORKING WOMEN'S CLUBS. Consult also Wertheimer, *Law Relating to Clubs* (2d ed., London, 1889).

CLUBFOOT (in Lat., *talipes*). A deformity of the foot, due to a distortion of one or more of the joints, and characterized by extreme extension, flexion, adduction, abduction, or rotation. Surgeons recognize several varieties: a turning in of the foot (*talipes varus*), a turning out (*talipes valgus*), an elevation of the heel so that the weight is borne on the ball of the foot and the toes (*talipes equinus*), and a depression of the heel with the front of the foot raised from the ground (*talipes calcaneus*). Two of these forms are frequently combined (*equinovarus*). We may also mention here the deformities flat foot (*pes planus*), where the arch of the foot is lost, and its opposite (*pes cavus*), where this arch is unduly exaggerated.

Clubfoot is either congenital or acquired. When acquired, the deformity is usually due to infantile paralysis (anterior poliomyelitis). The changes involve the muscles, tendons, bones, and ligaments. The treatment is manual, mechanical, or operative. Considerable improvement can be obtained in congenital cases by the first method, but those of long standing require splints or special apparatus, or surgical interference with sections of the tendons and frequently removal of parts of the bones. The first operation for clubfoot was done in 1731, by Stromeyer. Consult Gould and Pyle, article "Talipes," in *Cyclopedia of Medicine and Surgery* (Philadelphia, 1912).

CLUBHAND. A rare congenital deformity, in which the hand is closed or bent backward or to one side. Defective development of the bones of the wrist coexists, and other malnutrition is apparent in the child, who rarely survives.

CLUB MOSS, or GROUND PINE. Species of *Lycopodium* and *Selaginella*, resembling coarse mosses, and frequently bearing clublike cones (strobili) of spore-bearing leaves. See LYCOPODIALES; PTERIDOPHYTES.

CLUBROOT, or ANBURY. A disease to which turnips, cabbages, cauliflowers, rutabagas, and allied plants are liable, and which often proves of serious importance to farmers, destroying the crop of entire fields. It is called clubroot because of the knobs or tubercular excrescences which form upon the root. The root often becomes divided into a number of parts, each in some small degree swelling separately by itself; whence the popular name, "finger-and-toe disease." The disease is caused by *Plasmodiophora brassicæ*, a fungus of low order, which multiplies with great rapidity in the cells of the host. This acts as a stimulus, causing the roots to assume their strange appearance. The fungus can remain in the soil for a number of years. On this account, care should be taken to rotate crops, so that no cruciferous plants shall be grown on the infested land for several years. The seed bed is often a source from which the disease is spread, and it should receive attention. The application of lime every few years at the rate of 75 bushels per acre, has given promising results. It is also advisable to remove all infected plants as much as possible and rotate crops at frequent intervals.

CLUB-RUSH. See SCIRPUS.

CLUEN'TIUS HAB'ITUS, AULUS. A Roman central figure in a celebrated and complicated poison case, which involved two trials at Rome, in 74 and 66 B.C. On the latter occasion Cicero delivered the speech *Pro Cluentio*, still extant, which is rated highly. The speech was edited by Fausset (1887). Consult Nettleship, *Lectures and Essays on Subjects Connected with Latin Literature and Scholarship* (Oxford, 1885).

CLUGNY. See CLUNY.

CLUMBER SPANIEL. See SPANIEL; and Plate of TERRIERS, SPANIELS, ETC., under DOG.

CLUMSY, SIR TUNBELLY. A boorish country squire in Vanbrugh's play *The Relapse*. He also appears in Sheridan's *Trip to Scarborough*.

CLUNCH. Old Madge's husband in Peele's *Old Wives' Tale*.

CLU'NIACS, or CONGREGATION OF CLUNY. A branch of the Benedictine Order, founded at Cluny or Clugny in France about 910, by William, Duke of Aquitaine. He placed at its head Berno, who had made a great reputation by his conduct as abbot of the monasteries of Gigny and Baume. The order was noted for its rigorous discipline and its influence for reform. It spread rapidly, and in the fifteenth century had 825 houses (the 2000 sometimes assigned is probably exaggerated), spread from Scotland to Palestine, all connected with the house at Cluny. In England the first Cluniac house was founded in 1077. At the time of the suppression of the monasteries there were 32 houses. The Congregation in France was dissolved in 1790 by the Constituent Assembly; the town of Cluny purchased the magnificent abbey church for 100,000 francs and pulled it down. When, a few years later, the citizens invited Napoleon to visit them, he dismissed them contemptuously, calling them vandals. In Paris the present Hôtel de Cluny was begun in the fifteenth

century (on the site of the old palace of the early Frankish kings) by the Congregation of Cluny, but is now a rich museum owned by the city of Paris. The Congregation was reformed by Peter the Venerable (q.v.), and in 1131 Innocent II dedicated the great church of Cluny, which was one of the wonders of the world. Among the great men whom the Congregation has produced are Popes Gregory VII, Urban II, and Paschal II. Consult Sachur, *Die Cluniacenser* (Halle, 1891–94); Duckett, *Charters and Records of Cluni* (Lewes, 1890).

CLUNY, klụ'nē', or **CLUGNY** (Lat. *Cluniacum*, probably connected with OIr. *chain*, Ir. *clon*, meadow, Gk. κλέπος, *klepos*, moisture, Lith. *szlápias*, wet). A town in the Department of Saône-et-Loire, France, 12 miles northwest of Macon (Map: France, N., K 6). It has an excellent industrial college, and manufactures pottery, paper, leather, and yarn. Pop., 1901, 4108; 1911, 4150. Its architectural attractions include, besides the celebrated Benedictine abbey of the ninth century, the church of Notre Dame, dating from the thirteenth century; the church of Saint-Marcel, with a beautiful Romanesque steeple of the twelfth century; the ruins of Saint-Mayeul; the abbot's palace; portions of the ancient fortifications; and picturesque houses, dating from the twelfth century and later, all classed among the historical monuments of France. Before the erection of St. Peter's at Rome, the abbey church at Cluny, which was begun in 1089, was the largest building of its kind in Europe, being 650 feet long by 130 wide. It is now in ruins, having been destroyed by order of the town, to which it was sold after the convent was suppressed by the Constituent Assembly in 1790. (See CLUNIACS.) A model of it is preserved in the town museum, which was once a part of the abbot's palace. It is the birthplace of the noted painter Prud'hon. Consult: Bernard, *Les chartes de l'abbaye de Cluny* (Paris, 1876–94); Duckett, *The Archives of the Ancient Abbey of Cluny* (n. p., 1886); Penjon, *Cluny, la ville et l'abbaye* (Cluny, 1872).

CLUNY, klụ'nē', HÔTEL DE. A fine Gothic edifice in Paris, built during the fifteenth and sixteenth centuries by the abbots of the Benedictine abbey of Cluny, on the site of an ancient Roman palace. In 1515 it was occupied by Mary, the widow of Louis XII, and in 1537 James V of Scotland was married in it. It passed into the hands of the nation after the Revolution, was acquired in 1833 by the antiquarian Du Sommerard, and in 1842 was purchased with its collections by the State. The museum established in it is important for its antiquities, particularly of France.

CLUPEIDÆ (Neo-Lat. nom. pl., from Lat. *clupea*, small river fish + Gk. εἶδος, *eidos*, shape, form). An important family of soft-rayed fishes, including the herring, shad, sardines, alewives, etc. (qq.v.). The body is usually elongated and compressed; the head naked; the body covered with rather large scales, usually easily lost. The lateral line is wanting. There is only one dorsal fin, and the tail is forked. There are about 30 genera and 150 species found in all seas, and usually in immense shoals. Many species are anadromous, while some remain in fresh water permanently. See FISHERIES and FISH CULTURE, and Colored Plate of AMERICAN FOOD FISHES, under FISH AS FOOD, and Plate of HERRING AND SHAD.

CLUSERET, klụ'z'-rā', GUSTAVE PAUL (1823–1900). A French soldier and Communist, born in Paris. He was educated at Saint-Cyr, distinguished himself during the insurrection of 1848 in Paris, served in the Crimean War and in Africa against the Kabyles, and became a captain in 1855. In 1858 he resigned his commission, and in 1860, as commander of the French volunteers, joined Garibaldi in the expedition to Sicily and Naples. At the outbreak of the American Civil War in 1861 he came to the United States, entered the Union army, served on the staffs of McClellan and Frémont, and was brevetted brigadier general in 1862. In 1864 he was editor of the *New Nation* in New York, advocating the nomination of Frémont for the presidency. In 1867 he took part in the Fenian revolt and went back to France, where he wrote for several radical papers, but was condemned for certain publications and compelled to take refuge in England. On the proclamation of the Republic in September, 1870, he took part in the insurrectionary attempts at Lyons and Marseilles, whence he fled to Geneva. In 1871, after the establishment of the Commune, he was appointed delegate of the War Department, and endeavored to improve the military organization of the Communist troops, but soon gave offense to the Central Committee, was accused of treachery, and was imprisoned at Mazas. When the government troops entered Paris, he escaped to England, thence to Mexico, and finally to Switzerland. In 1872, during his absence, he was formally sentenced to death; he returned to France in 1881, having spent several years in Turkey, and was elected to the Chamber of Deputies in 1888, 1889, and 1893. He published *Mémoires du général Cluseret* (1887–88).

CLUSTER CUP. See ÆCIDIUM; UREDINALES.

CLUSTERED PIER, or CLUSTERED COLUMN, or COMPOUND PIER. A form of architectural support characteristic of the Middle Ages, though not absolutely unknown to the ancient East, as is shown by the Babylonian cluster of four columns found at Tello. It was not used in the classic, early Christian, or Byzantine style, nor until the development of the vaulted Romanesque in the eleventh century. It probably originated in the attempt to vary the plain square pier which was then being used in place of the classic column, and to connect it with moldings of the arcades and the ribs of the vaulting. These Romanesque piers had a square or rectangular core, to each face of which a semicolumn or engaged shaft was attached; this simplest form was varied by the addition of minor shafts and reëntrant angles. Very rich effects were thus obtained, especially in central France and England during the twelfth century. The developed Gothic style of the thirteenth century adopted the clustered pier as its regular support in interior architecture. The Gothic pier differed from the Romanesque in being usually more slender and more varied in plan, and in a majority of cases based on a circular or polygonal instead of a square core. The larger shafts were sometimes—especially in England—separated from the core, to which they were fastened only at the base and at the capital and by intermediary molded bands. But this form was found unsatisfactory and was abandoned except in England for the solid pier, which was a better support. Its simplest form with circular core is shown in the nave of Amiens Cathedral, but its variations are infi-

nite, being determined largely by the number, form, the grouping of the vaulting ribs and moldings above, by connecting with which the effective sweep of architectural lines is continued from floor to vaulting ridge. The neoclassicism of the Renaissance put an end to the clustered pier almost entirely except in its simplest rectangular forms.

CLUTCH. A mechanical device whereby it is possible to transmit the rotary motion of a shaft by means of connecting two elements which normally are independent. This connection may be established by means of teeth, by the friction of two surfaces, by pins and studs, by cams, or in other ways. The clutch finds extensive application for the transmission of power in various mechanical devices, and perhaps the most important types are the friction clutches, where two surfaces rub on each other when the clutch is thrown into gear, the pressure of contact being sufficient so that the friction is increased to a degree that the surfaces, which may have special coatings as of wood or cork, bind and one surface is enabled to drive the other. These surfaces may take the form of disks placed at right angles to the shaft, of blocks sliding on its outer or inner surface, of a surface or band on the rim of a pulley on the shaft, of two conical surfaces, internal and external, or of a band and ribbon around a pulley, or some one of numerous other devices. There are also magnetic clutches where the two parts are brought together by the action of powerful electromagnets. The advantage of the clutch is that shafts may be put into motion gradually without shock, and for this object they find extensive application in motor vehicles (q.v.).

For detailed consideration of friction clutches, consult Souther, in *Transactions American Society of Mechanical Engineers for 1908.*

CLUTE, WILLARD NELSON (1869–). An American botanist, born at Painted Post, N. Y. Between 1897 and 1911 he was assistant curator of the botanical department of Columbia University, curator of the New York Botanical Garden, instructor in biology in the Joliet (Ill.) High School, and instructor in botany in the Curtis High School, Chicago. In 1911 he became head of the biology department in the Girls' Technical High School, Chicago. He was at one time publisher of the *Plant World* and later became both editor and publisher of the *Fern Bulletin* and the *American Botanist.* He founded the American Fern Society in 1893. His publications include: *A Flora of the Upper Susquehanna Valley* (1898); *Our Ferns in their Haunts* (1901); *The Fern Collector's Guide* (1902); *The Fern Allies of North America* (1905); *Laboratory Botany for the High School* (1909); *Agronomy for High Schools* (1912; 2d ed., 1913); *Laboratory Manual and Note Book in Botany* (1913).

CLUT'TERBUCK, CAPTAIN CUTHBERT. A retired officer, the fictitious editor of Scott's *The Abbot, The Monastery,* and *The Fortunes of Nigel.*

CLUVER, klōō'vẽr, or **CLÜVER,** klü'vẽr, PHILIPP (1580–1622). A German antiquarian and geographer, born in Danzig. He first studied law in Leyden, but soon forsook it for archæology and geography, whereupon his father withdrew all support and he was obliged to take service in the Austrian army. From 1607 to 1613 he traveled through Norway, England, Scotland, France, Germany, Switzerland, and Italy, and in 1615 he settled in Leyden, where he was made "Geographus Academicus." In 1617–18 he roamed once more through Italy and Sicily, on foot and under great hardship. He was the founder of historical geography and author of *De Tribus Rheni Alveis atque Ostiis* (1611); *Germania Antiqua* (1616); *Sicilia Antiqua* (1619); *Italia Antiqua* (1624), his principal work; and *Introductio in Universam Geographiam* (1624).

CLYDE (called *Glotta* by Tacitus, connected with OIr. *Cluad,* name of a river, Gk. κλύζειν, *klyzein,* to wash out, Lat. *cluere,* to purify, Goth. *hlūtrs,* AS. *hlūttor,* Ger. *lauter,* pure). The third in size, commercially the most important river in Scotland, widely celebrated for the romantic beauty of its scenery (Map: Scotland, D 4). It is formed by the Daer Water, the Potrail Water, and several small streams of the semicircular range of the Hart, Queensberry, and Lowther hills, and drains the counties of Lanark, Renfrew, and Dumbarton, flowing past Lanark, Hamilton, Glasgow, Renfrew, Bothwell, Crawford, Lamington, Blantyre, Uddingston, and Dumbarton, near which town it opens into the Firth of Clyde. In this course it receives the Medwin, Carnwath, Mouse, Calder, North Calder, Kelvin, and Leven rivers. It flows through a fertile, wooded valley, often extending into level plains, and often having bold, wooded banks. From 2 miles above to 4 miles below Lanark are the celebrated falls of Clyde—a series of four cascades and rapids, the largest in Scotland; the total descent in the course of 6 miles being 230 feet, amid very picturesque scenery. Corra Linn, the grandest fall, forms three distinct leaps—in all 84 feet high. Below Glasgow the Clyde expands into an estuary, navigable by the largest vessels, and at Greenock it attains a breadth of about 4 miles. Opposite this point the Gareloch empties into it, and a short distance below, Loch Long on the north. Turning, it expands into the Firth of Clyde, which extends between Argyll on the west, and Renfrew and Ayr on the east, to the North Channel at the island of Ailsa Craig, where its breadth is about 30 miles. In the Firth of Clyde are the islands Arran, Bute, Great Cumbrae, and Little Cumbrae. In the north a narrow arm, called Loch Fyne, extends far into Argyll. The Clyde from its source to Glasgow is, by its windings, 75 miles long, and from Glasgow to the south end of the peninsula of Cantyre the distance is about 90 miles. The basin of the Clyde occupies 1500 square miles. Floods sometimes raise its waters 20 feet. Clydesdale, or the valley of the Clyde, is noted for its coal and iron mines, orchards, and horses. The falls of Clyde furnish power for many mills, especially cotton. Bell, in 1812, launched on the Clyde the first steamboat, and to this day in Europe the Clyde forms the centre of the shipbuilding industry in Scotland. Consult Millar, *The Clyde from its Source to the Sea* (London, 1888).

CLYDE. A village in Wayne Co., N. Y., 38 miles west of Syracuse, on the New York Central and the West Shore railroads, and on the Barge Canal (Map: New York, D 4). It contains glassworks, steam-engine and boiler factory, cannery, and harness works. Pop., 1900, 2507; 1910, 2695.

CLYDE. A village in Sandusky Co., Ohio, 75 miles west by south of Cleveland, on the Cleveland, Cincinnati, Chicago, and St. Louis, the Lake Shore and Michigan Southern, the Wheeling and Lake Erie, and the Lake Shore Electric

railroads (Map: Ohio, E 3). The village contains a Carnegie library and a monument to Gen. James B. McPherson, who was born and buried here. There are manufactories of cutlery, kraut, automobiles, barrels, and screens, and granite works. The water works and lighting plants are publicly owned. Pop., 1900, 2515; 1910, 2815.

CLYDE, JOHN CUNNINGHAM (1841–1915). An American clergyman, born at White Deer Valley, Lycoming Co., Pa. After serving in the Civil War he was educated at Lafayette College and Princeton Theological Seminary. In 1869 he was ordained to the Presbyterian ministry. He was pastor at Frazer, Pa. (1872–79), and at Bloomsbury, N. J. (1879–1901). His publications include: *Rosbrugh, a Tale of the Revolution* (1880); *Life of James H. Coffin* (1881); *History of the First Presbyterian Church of Bloomsbury, New Jersey* (1884).

CLYDE, LORD. See CAMPBELL, SIR COLIN.

CLYDE'BANK. A town in Dumbartonshire, Scotland, on the Clyde, 7 miles northwest of Glasgow (Map: Scotland, D 4). It has extensive yards for building iron and steel ships, engineering works, and distilleries. Pop., 1901, 18,670; 1911, 16,202.

CLYDES'DALE, or **PAISLEY TERRIER.** See TERRIER.

CLYMENE, klīm'ē-nē. 1. The daughter of Oceanus and Tethys, and mother, by Iapetus, of Atlas, Prometheus, and Epimetheus. 2. The mother of Phaëthon (q.v.).

CLYME'NIA (Neo-Lat. nom. pl., from Lat. *Clymene*, Gk. Κλυμένη, *Klymenē*, name of a nymph, originally p.p. of κλύειν, *klyein*, to hear). A genus of goniatitoid cephalopods, found in the Upper Devonian rocks of Europe and North America, and distinguished from the other goniatites by the dorsal position of its siphuncle. The shell of this genus is a flattened spiral, the whorls of which are closely coiled so that each whorl clasps the outer half of that next inside it. The suture lines are simply curved or lobed. In some beds of the European Upper Devonian the shells of this genus are so abundant as to give the name "Clymenienkalk" to the limestone containing them. Consult Foord and Crick, *Catalogue of the Fossil Cephalopoda in the British Museum of Natural History*, part iii, pp. 14–32 (London, 1897). See also GONIATITES; CEPHALOPODA; DEVONIAN SYSTEM.

CLYMER, klī'mēr, GEORGE (1739–1813). An American patriot, one of the signers of the Declaration of Independence and a prominent member of the Constitutional Convention of 1787. He was born in Philadelphia, was orphaned when only one year old, was educated at the College of Philadelphia (now the University of Pennsylvania), and became a merchant in his native city. In 1772 he was appointed by Governor Penn to the position of "Justice of the Court of General Quarter Sessions of the Peace, and of the County Court of Common Pleas of Philadelphia." On the approach of the Revolutionary War he became an active member of the patriot party, and was chosen successively a member of the Committee of Correspondence (1774) and of the Provincial Congress of Pennsylvania (1775). From July, 1775, to August, 1776, he served as one of the two treasurers of the Continental Congress; from October, 1775, to July, 1776, he was a leading member of the Pennsylvania Committee of Safety; and in July, 1776, he was one of the five men who were appointed by the Pennsylvania Legislature in place of the Pennsylvania delegates who had opposed the Declaration of Independence, which document he signed on August 2. He was a prominent member of the Constitutional Conventions of Pennsylvania in 1776 and 1779; served as captain under Cadwalader at the battle of Princeton; was a member of the Pennsylvania Assembly in 1777 and 1778; was reëlected to the Continental Congress in March of 1778; was sent to Valley Forge by Congress as a special commissioner to inquire into the alleged maladministration of the Commissary Department; and in 1778 was one of the special commissioners sent by Congress to treat with the Indians at Fort Pitt (Pittsburgh). In May, 1780, he cooperated with Robert Morris and others in founding the Bank of Pennsylvania to facilitate the furnishing of supplies to the army, and in both 1780 and 1781 he was reëlected to the Continental Congress, by which in 1782 he, with Edward Rutledge, was sent as special commissioner to the Southern States, to secure the payment of funds due to the national treasury. From 1782 to 1785 he lived at Princeton, N. J., but returned to Philadelphia in the latter year, and from then until 1789 was an influential member of the Pennsylvania Assembly. He took a prominent part in the Constitutional Convention of 1787; was a member of Congress from 1789 to 1791; was appointed by Washington in 1789 Supervisor of the Internal Revenue for Pennsylvania, in which capacity he was charged with the collection of the tax on spirits which brought on the Whisky Insurrection (q.v.); and in 1796 was one of the special commissioners appointed by Washington to treat with the Creeks and Cherokees in Georgia. Subsequently, though taking no further part in public life, he took an active interest in public enterprises of various kinds, devoted much of his time to reading and study, and was president of the Philadelphia Bank and of the Academy of Fine Arts. He was one of the foremost leaders during the Revolutionary period and had a wide reputation for ability, learning, and patriotism. Consult Dickenson, in the *Magazine of American History*, vol. v (New York, 1880).

CLYSTER, klīs'tēr (Lat., from Gk. κλυστήρ, *klystēr*, a syringe, from κλύζειν, *klyzein*, to purify). An old term for a medicine administered in the liquid form by the rectum, or lower end of the intestines. See ENEMA.

CLY'TEMNES'TRA (Lat., from Gk. Κλυταιμνήστρα, *Klytaimnēstra*). In Greek legend, the daughter of King Tyndareus and Leda, and the twin sister of Helen. She became the wife of Agamemnon (q.v.), and bore him a son, Orestes, and three daughters, Iphigenia, Electra, and Chrysothemis. While Agamemnon was at Troy, she formed an adulterous connection with Ægisthus (q.v.), murdered her husband on his return, and reigned for seven years with Ægisthus, till she was murdered by Orestes (q.v.).

CLYTIE, klī'tē (Lat., from Gk. Κλυτίη, *Klytiē*). A Greek maiden beloved by Helios (the sun). When he deserted her for Leucothea, she betrayed the latter to her father, who put her to death. As her lover did not return, Clytie gazed ever after him, until in pity the gods changed her to a flower, called by the Greeks ἡλιοτρόπιον, *hēliotropion*, of the same family as our heliotrope. The so-called Clytie of the British Museum is only the portrait of a Roman maiden.

CNIDUS, nī'dŭs, or GNIDOS (Lat., from Gk. Κνίδος, *Knidos*). An ancient city on the western extremity of the promontory of Triopion (now Cape Krio), in Caria, Asia Minor, founded as a colony from the east coast of the Peloponnesus, and hence said to be both Laconian and Argolic; it was one of the six cities of the Dorian League. Cnidus (according to Strabo) had two ports, one of which was a closed harbor for war vessels. The original settlement was on an island, but the city later spread to the mainland, and a mole was built to unite the two parts. The southern port was formed by two moles carried into the sea to the depth of nearly 100 feet, one of which is nearly perfect at the present day. The city was famous for its worship of Aphrodite, and in one of its temples was the famous nude statue of the goddess by Praxiteles. The Cnidians valued this work so highly that they are said to have refused the offer of Nicomedes of Bithynia to pay their large public debt in exchange for this statue. Off Cnidus, the Athenian admiral Conon defeated the Spartan fleet in 394 B.C., and thus broke the power of Sparta in Asia Minor. The site is still covered with ruins. In 1857–58 Sir Charles T. Newton excavated the sacred precinct of Demeter, discovering the fine seated statue of the goddess now in the British Museum. Famous citizens of Cnidus were Eudoxus (q.v.), Ctesias (q.v.), and Sostratus, who built the Pharos (q.v.) at Alexandria. Consult Newton, *Discoveries at Halicarnassus, Cnidus, and Branchidæ* (London, 1862–63), and *Travels and Discoveries in the Levant* (London, 1865).

CNOSUS, nō'sŭs, GNOSUS, or KNOSUS (Lat., from Gk. Κνωσός, *Knōsos*, or less correctly Κνωσσός, *Knōssos*). An ancient city of Crete, on the north side of the island, 3 miles from the coast, near the modern Candia (q.v.), famous in legend as the home of King Minos (q.v.). The Dictæan cave in the neighborhood was a legendary birthplace of Zeus, though in later times somewhat supplanted as a seat of worship by the Idæan cave on Mount Ida. Here also legend placed the famous labyrinth (q.v.), in which the Minotaur was confined. In historical times Cnosus was inhabited by Dorians, and shared with Gortyna the chief power in the island. It finally became a Roman colony. The site has become highly important in the study of the civilization known as Ægean or Minoan from the excavations made by Sir A. J. Evans since 1899–1900. These have shown that the site of the early town was abandoned near the end of the Mycenæan period, never to be reinhabited. A city of the Mycenæan period has been discovered, and also a palace of far greater size and splendor than any previously known, bearing witness to the great power of the rulers of Cnosus in the heroic age. The decorations include wall paintings on stucco, and reliefs of an artistic merit hitherto unsuspected for so remote a period (about 2000–1200 B.C.) outside of Egypt. The art, however, is not Egyptian, but must be attributed to the pre-Dorian civilization of Greece. In the palace were also found a great number of clay tablets bearing inscriptions in two varieties of writing, neither of which can be read, though it seems clear that some of the tablets contain inventories of chariots, shields, and other stores. Consult Sir A. J. Evans, *An Atlas of Knossian Antiquities* (London, 1914). See ARCHÆOLOGY, *Mycenæan Period;* CRETE.

CNUT. See CANUTE.

COACH (Fr. *coche*, Ger. *Kutsche*, probably from Hung. *kocsi*, coach, named after a little place called Kocs (pronounced Koch) in western Hungary). A heavy inclosed four-wheeled carriage for the conveyance of passengers. The construction of the coach differs from that of other inclosed vehicles in the following particulars: 1. The roof forms a part of the framing of the body, and in this respect the construction is different from other covered carriages in which the roof is simply a canopy supported by iron rods or wooden pillars. 2. Coaches from the earliest times were suspended on springs. The coach sent by Ladislas, King of Hungary, to Charles VII of France is described as a carriage the body of which "trembled." 3. A coach is always designed with more than one seat for passengers.

According to Thrupp (see *Bibliography* below), coaches were first made in the town of Kocs, Hungary, and were so called from the name of the town, just as landaus and berlins are named from the towns which produced them. The same author traces their development from the huge agricultural wagons used on the Continent in the twelfth and thirteenth centuries, which were so constructed that, by different adjustment, they could carry a long timber, a cask of wine, a load of hay, or a family. The coaches of the Middle Ages were very elaborate affairs, used only by royalty and nobility, and for purposes of state. As late as 1550 there were only three coaches in Paris; one of these belonged to the Queen, another to Diana of Poitiers, and a third to a nobleman who was too corpulent to ride a horse. In 1631 a "glass coach," that is, a coach with glass windows, was built for the Infanta of Spain.

The first coach ever seen in England was made in 1555 by Walter Rippon for the Earl of Rutland; in 1564 the same builder made a showy vehicle for Queen Elizabeth. Later in her reign the royal coaches were constructed with sliding panels, so that the Queen could show herself to her subjects whenever she desired.

Stagecoaches. The Romans during the Empire had a system of public vehicles for hire which traveled over definite routes and probably at stated times. During the Middle Ages no such system of public conveyance prevailed. Towards the end of the sixteenth century wagons began to travel regularly between the principal towns of England to carry goods and people. These wagons were called stages. They were soon superseded by coaches. In 1662 we find a writer condemning this innovation because "these coaches make country gentlemen come to London on small occasion, which otherwise they would not do but on urgent necessity; nay, the conveniency of the passage makes their wives often come up, who, rather than make such long journeys on horseback, would stay at home. Here, when they come to town, they must be in the fashion, get fine clothes, and by this means get such a habit of idleness and love of pleasure that they are uneasy ever after." In spite of such protests coaches became more and more popular, and by 1750 an elaborate system of routes had been established. In 1784 these coaches began to carry the mail. The flourishing period of the stagecoach was at the opening of the nineteenth century. About this time an extensive good-roads movement had been inspired by the systems of Macadam and Telford. The stagecoach acquired a speed of 10 miles

an hour on the most important English routes. In America stage routes, although established between some of the principal cities, were never developed to the extent to which they were in England—a condition of affairs to be explained by the poor roads and the more sparsely settled territory. The introduction of transportation by steam proved a speedy and successful rival. This form of carriage—the railway car—has been given the name of coach, and, indeed, the early passenger cars were modeled in shape after the coaches. For further history, see COACHING.
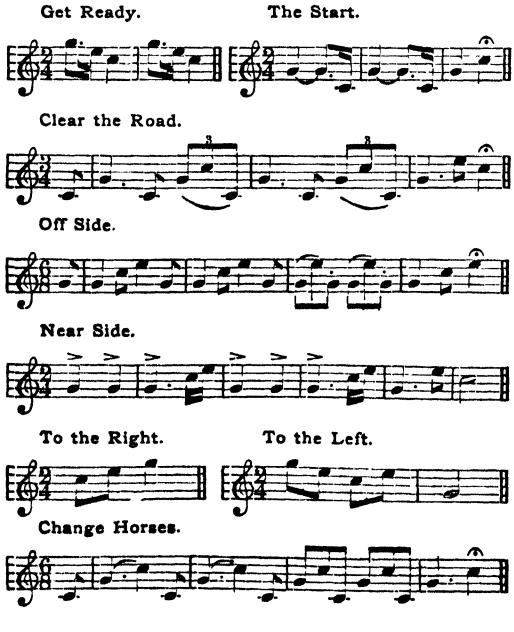
At the beginning of the twentieth century coaches are built both for public and private use, though the advent of the motor car has detracted from their use. In design they are closely akin to those in use in England during prerailroad days. They may be described as consisting of two parts—the *carriage* and the *body*. The former comprises the axles, perch (or reach), futchels, and transom (or bed), and many minor component parts, which together with the wheels form a complete vehicle or carriage upon which the body part is supported by the springs. The latter are secured to the bed and body by clips, and are always made of several stiff plates, because of their greater elasticity as compared with one plate of steel of the same length. The pole fits between the inside futchels and completes the carriage part. In the best-made carriages the dimensions of a pole are 3½ inches wide and 4¼ deep, measured at a point 2 feet from the splinter bar. For horses averaging between 15 and 16 hands, the length of the pole is usually 9 feet from the front of the splinter bar to the crosshead or the polehead; for smaller horses, cobs, etc., about 3 inches shorter. The *body* is practically the same in all coaches and is usually 4 feet 10 inches in length, 4 feet wide, and 4 feet 2 inches high. It is built as lightly as possible, so as not to detract from the centre of gravity of the coach. The roof is almost flat, in order that seats may be built on it, or for baggage, and the sides have a "cant" in a horizontal direction and the "turn under" in a vertical direction. There are two *boots*, the one in front being a few inches higher on the body than the hind boot, which latter is about 2 feet long (the front one 3 feet) and 2 feet deep. Both these boots are a little narrower than the body. The *box* and *driving seat* are placed on the front part of the front boot and are supported by solid ends or risers. The shape of the seat is made by the cushion, and not by the seat itself, which is always flat. All modern coaches have brakes, but a good driver rarely has recourse to them, except in emergencies. (See DRIVING.) A complete set of tools is carried in case of accidents to horses or vehicle. The weight of a road coach varies from 2200 to 2600 pounds. Builders generally contrive to throw more of the whole weight into the carriage part, in order to keep the centre of gravity low, and because it has to withstand the bulk of the strains.

The typical American coach is the Concord coach, so called from Concord, N. H., where many of them were built. Its principal constructive features are three parallel straight perches connecting the hind axle with the front transom bed, which steady a very rigid, rectangular frame. At each of the four corners of this frame are placed stiff iron standards carrying at their upper ends square iron shackles. Connecting with these shackles are strong leather straps, upon which rests the body of the coach, a mode of suspension common to European carriages before the use of springs. These latter are entirely absent in the Concord coach. The so-called *hackney coach* is a smaller four-wheeled vehicle for hire.

Bibliography. Consult: Adams, *English Pleasure Carriages* (London, 1837); Thrupp, *History of the Art of Coach-Building* (London, 1877); Gilbey, *Early Carriages and Roads* (London, 1903); Straus, *Carriages and Coaches: Their History and their Evolution* (London, 1912). See CARRIAGE; COACHING.

COACH DOG, or DALMATIAN CARRIAGE DOG. A dog of medium size, related to the hounds (q.v.), and having the form and smooth coat of a pointer, which properly is used only to follow a carriage, as an ornamental part of the equipage, and as a watchdog about the stable. This dog should, therefore, be capable of endurance on foot, trim of form, well groomed, and "stylish" in appearance. The coat must be pure white, evenly spotted with small, round, *distinct* spots, from half an inch to an inch in diameter, either perfectly black or pure brown. The head should be long, fine, and like that of a pointer, but not so deep. This dog is commonly said to have been first bred in Dalmatia, but the same breed seems to have been common in Spain as early, at least, as the sixteenth century. It is often used in Denmark to draw carts. See DOG.

COACH HORN. A straight tapering horn made of brass or copper, and used to sound certain simple calls. There are no keys and the range is limited to the six open notes (c^1-g^1-c^2-e^2-g^2-c^3), of which the high c is exceedingly difficult. The coach horn varies considerably in length, a short (42-inch) horn giving more brilliant notes, and a long (56-inch) horn giving a softer, richer tone. The various calls sounded with the coach horn have a well-recognized place in coaching; and in addition to those used universally, as in the case of examples noted below, there are others employed by particular coaches and routes. A few of the best-known calls are as follows:



COACHING. Driving or being driven in a coach (q.v.) drawn by four or more horses. The driving of a coach requires great skill, coolness, judgment, and a knowledge of horses on the part of the driver; and, where indulged in as a sport or pastime, may be said to derive its greatest attraction from that fact alone. The history of coaching is naturally part of the history of the coach, for which see article COACH. The first stage in England was put on the road in 1659 and traveled between London and Coventry. At the beginning of the eighteenth century there were many coaches employed throughout the country; but the slowness of travel was such that it took a week to go from London to York, and proportionately for all lesser distances. The royal mail, which had been carried by a system of postboys under a contract speed of five miles an hour, was, in 1784, undertaken by Palmer's mail-coach service, which carried mail as well as passengers, and grew to such a success that the average speed rate of mail coaches was brought up to 10 miles an hour. This, however, was due almost entirely to the improvements in road construction instituted by Macadam and Telford.

In 1836 coaching had become so important an institution that 54 coaches were employed in England, 30 in Ireland, and 10 in Scotland. The British government exercised a rigid supervision and discipline over the stagecoach service, because of its connection with the post-office system, and exacted a military punctuality and regularity in its running and general management. The landed and country gentry, generally, maintained a zealous watchfulness over the condition of the roads, and consequently much competition was indulged in by the people of the countryside, to attract coaches to some particular route, and among the coaches themselves, to establish the best records. The drivers were frequently gentlemen, and often members of the aristocracy. The "Brighton Age," in its palmy days, numbered among its professional drivers Charles Jones, Sir St. Vincent Cotton, Dick Brackenbury, and many others; while such distinguished men as the Duke of Beaufort, Lord Chesterfield, and Prince Henry Batthyányi were among the amateur drivers of that and similar coaches. Professional drivers would frequently receive as much as $3000 and $4000 per year for their services; an immense salary for those days, and the best indication of the importance attached to the position. After 1840 coaching as a public necessity ceased to be; and with diminishing business, decay set in rapidly.

In America, even in Colonial times, four-horse stage wagons were in regular employment throughout the country, the most important (1760) plying between Philadelphia and New York. Owing to the absence of regular roads, the saddle horse was the favorite means of transport. Coaching as a recreation or amusement began in England about 1868—a revival which spread to America as well as throughout continental Europe. In England it had as its leading supporters men who remembered the pre-railroad coaching days, and desired to save the institution from the oblivion which threatened it. A more or less successful effort had been made to keep alive the old spirit of coaching on one or two of the older routes; but at the time of the so-called revival the Four-in-Hand Club, established in 1856, and Sir Henry Peyton, were the only interested ones. The results were not very permanent so far as England was concerned; for in 1880 there were only four coaches running—a state of things, however, which has since considerably improved.

In 1877 the "Old Times" was again put on the road between London and St. Albans; the Four-in-Hand and the Coaching clubs afterward became permanent organizations, and their "meets" have come to be regarded as among the social events of the London season. The first English coaching club was the B. D. C., or Bensington Driving Club, limited originally to 16 members, and first organized in 1807. In 1823 the annual club meets were abandoned, and in 1856 the club ceased to exist. The Four-Horse Club, frequently but inaccurately referred to as the Four-in-Hand Club, was formed in 1808, and, after a varied career, disbanded in 1830. Amateur coaching in the United States may be said to have antedated the English revival by two or three years, August Belmont putting the first coach on the road in 1864. Leonard Jerome is credited with the distinction of driving the first American-built coach, and he, together with a number of other gentlemen, founded in 1875 the New York Coaching Club. Since then coaching has been a regular feature of fashionable New York and Newport life, the number and equipment of the coaches employed comparing most favorably with those of either London or Paris. Indeed, modern coaching in both England and France has received no little impetus from American lovers of the pastime.

At the present day coaching is confined almost exclusively to such great centres and cities of the world as are most frequented by the wealthy and leisure classes, as London, New York, Paris, Berlin, Vienna, etc., and is generally employed in connection with racing and trips to summer resorts. The first amateur road-coach service in the United States was established in 1876 between the Brunswick Hotel, New York City, and Pelham Bridge (15½ miles). The following is a list of the principal road coaches of New York, London, and Paris, past and present, together with their routes and time taken. *New York:* Holland House to Ardsley Casino, 25.8 miles in 2½ hours. *London:* Northumberland Avenue to Box Hill, 25 miles in 3 hours; Northumberland Avenue to Virginia Water, 26.5 miles in 3¼ hours; Northumberland Avenue to Windsor, 30 miles in 4 hours. *Paris:* New York Herald Office to Cernay-la-Ville, 29 miles in 3 hours; New York Herald Office to Pontoise, 26.3 miles in 2¾ hours; New York Herald Office to Maisons-Lafitte, 19.4 miles in 2 hours; New York Herald Office to Versailles, 14.5 miles in 1¾ hours. Of the "two-days" trips, or routes which require an entire day each way, the most important in the United States is that from the Holland House, New York, to Philadelphia and return, about 90 miles each way, taken annually by the New York Coaching Club members. In England, the journey from the White Horse Cellar, Piccadilly, to Brighton (54 miles) is accomplished in 6 hours; while in France the distance from the New York Herald Office, Paris, to Fontainebleau (60 miles) is accomplished in 7 hours. *Stages:* Under the best conditions a change of horses would be made every seven miles, but ordinarily it has to be done to suit the available stabling accommodations of the route. The best authorities agree that a fast coach running out and in is best served by having a horse to each mile of the road. Thus

30 horses would be necessary to run a coach out and in once a day, between points 30 miles apart. An illustration of the distance between stages under normal conditions, over a route 28 miles long, would be as follows: First stage 7, second stage 8, third stage 7, fourth stage 6 miles, each team serving one stage each way. On hilly roads longer stages are frequently made, but at a greatly reduced rate of progress. It is common experience that "pace" rather than "pull" is responsible for the disablement of the average coach horse. The bibliography of coaching is somewhat limited, but the following works are both interesting and comprehensive: Nimrod (C. J. Apperley), *Essays on the Road* (London, 1876); Rogers, *A Manual of Coaching* (Philadelphia, 1900); Ware, *Driving* (New York, 1903); Tristram, *Coaching Days and Coaching Ways* (New York, 1903).

COACHWHIP SNAKE. See WHIP SNAKE.

COAG'ULA'TION (Lat. *coagulatio*, from *coagulare*, to curdle, from *coagulum*, rennet, from *co-*, together + *agere*, to drive). The amorphous solidification of a liquid, or part of a liquid, as when the casein of milk is solidified by rennet in making cheese (q.v.), or the white of an egg by boiling. The process varies in various substances. Albumen, or the white of an egg, is said to coagulate at a temperature of about 71° C. (160° F.), although coagulation would undoubtedly take place also at lower temperatures, only more slowly. Milk is coagulated or curdled by the action of the rennet or by acids. The fibrin in the blood, chyle, and lymph of animals coagulates after the separation of these fluids from the living body.

COAHUILA. See KAWIA.

COAHUILA, kō'â-wē'lâ (named from the Mexican tribe *Coahuiltecs*). A northern state of Mexico, separated from Texas on the north and east by the Rio Grande, and covering an area of 63,745 square miles (Map: Mexico, II 4). With the exception of the eastern part, which is somewhat mountainous, the surface forms an elevated plateau, with a general incline towards the Rio Grande. The western part is taken up by the Bolson de Mapimi, a semidesert region, only partially explored, with many lagoons and vast mineral resources. The climate is moderate and healthful. Mining is an important industry of the state. Silver, lead, and zinc are the chief metals extracted. It is the only Mexican state in which coal is mined. The chief occupation is cattle raising, although the soil is well adapted for the growing of cereals and European vegetables, to which more and more attention is being paid. In the southwest some vines and cotton are cultivated. The state is traversed from north to south by the Mexican International Railway. Its southern section is well provided with railroads. Pop., 1910, 367,652; capital, Saltillo (q.v.).

COAITA, kō-ī'tâ. See SPIDER MONKEY.

COAL (AS. *col*, OHG. *kolo*, Ger. *Kohle;* ultimately connected with Skt. *jval*, to blaze, and probably with Ir., Gael. *gual*, coal). A mineral fuel of solid character, found and used in many countries. The name is a word common to all the languages of the Gothic stock, and seems allied to the Latin *calere*, to be hot; as also "to glow," and "kiln." The word "coal" has often prefixed to it some qualifying word, to distinguish different kinds of coal; such as cannel coal, stone coal, pea coal, etc.

ORIGIN. Coal is one of the most important economic minerals, and is of vegetable origin. When vegetable matter accumulates under water it undergoes a slow process of decomposition, gradually giving off its nitrogen, hydrogen, oxygen, and some carbon, the result of which if carried far enough is the formation of a mass of carbon. Peat (q.v.), the material so often found underlying swampy tracts in north temperate zones, but occurring also even in warmer climates, represents the first stage in the coal-forming process, and the further stages are obtained by the burial of these vegetable deposits under great loads of sediment, where they become subjected to pressure, and at times to heat also. This effects a series of changes, especially consolidation and loss of oxygen, and gives a series of products, whose nature depends on the degree to which the original vegetable matter has been changed. The products are known as *lignite, subbituminous coal, bituminous coal, semibituminous coal,* and *anthracite coal;* these five types being connected by all degrees of intermediate stages. In Carboniferous times certain regions were covered by rank and luxuriant vegetation which grew upon swampy land slightly raised above the level of the sea. As the plants died, their remains fell into the water of the swamp, and slowly formed an accumulation of vegetable matter of increasing thickness. By slow subsidence this thick layer of vegetable matter sank below the water, and became gradually covered by sand, mud, or other mineral sediments, washed out from the shore. Successive elevations and depressions, with intervening accumulations, may thus have yielded successive beds. Subsequent elevation, folding of the earth's crust, and accompanying metamorphism, followed by erosion of the surface, has exposed to view the edges of the once deeply

ANALYSES OF COALS

LOCALITY	PROXIMATE					ULTIMATE					
	Moisture	Volatile matter	Fixed Carbon	Ash	Sulphur	Hydrogen	Carbon	Nitrogen	Oxygen	Calories	British Thermal Units
Peat, Orlando, Fla.	13.19	56.83	24.30	5 68	.49	6.06	51.18	2.56	34.03	4,961	
Lignite, Crockett, Tex	13.40	42.75	29.00	14 85	1.04	5.57	52.06	.95	25 53	5,199	9,358
Subbituminous, Lafayette, Colo.	13.49	37.11	43.03	6.37	.58	5.75	61.13	1.22	24.95	5,995	10,791
Bituminous, Johnstown, Pa.	2 35	14.30	71.40	11.95	3.30	4.22	75.16	1.13	4.24	7,382	13,228
Semibituminous, Coal Hill, Ark.	1.28	12.82	73.69	12.21	2.01	3.74	77.29	1.39	3.36	7,448	13,406
Semianthracite, Russellville, Ark.	2 07	9.81	78.82	9.30	1.74	3.62	80.28	1.47	3.59	7,612	13,703
Anthracite, Schuylkill Co., Pa.	2.80	1 16	88.21	7.83	.89	1.89	84.36	.63	4.40	7,338	13,298

buried beds of coal. In the United States and even in other countries conditions favorable for coal formation occurred also in the Triassic, Cretaceous, and Tertiary.

Composition. The composition of coal may be expressed in either the elementary or the proximate form, as shown in the preceding table, in which it will be noticed that the ash and sulphur are common to both. These analyses of the several members of the coal series indicate the general increase in carbon, and decrease in oxygen, hydrogen, and nitrogen in passing from the lower to the higher members of the series. Of the two methods for expressing the composition of the coals, the proximate is of greater commercial importance, and is sometimes also used as a basis for classification.

A proximate analysis like the above is of practical value, since it gives us a better conception of the coal worth. Thus the freedom of burning increases with the amount of volatile matter, which may have a variable composition. The volatile matter of coals from the eastern United States and Canada is rich in hydrocarbons, while that of coals from Western States contains more carbon monoxide and carbon dioxide, as a result of which it gives less heat and less smoke in burning. The heating power depends chiefly on the amount of fixed carbon present. Sulphur is an injurious constituent when the coal is to be used in the manufacture of gas or for metallurgical purposes; while ash is undesirable, since it displaces so much carbon, and if it contains fusible impurities such as iron, lime, or alkalies, it causes clinkering. Moisture retards the heating power of the coal until it is driven off.

The heating power of coal, which can be expressed in calories or British thermal units (B. T. U.), is its most important property, and is often tested by means of an apparatus known as a "calorimeter" (see CALORIMETRY). The principle of the test depends on the determination of the weight of water which one pound of coal can convert into steam at 212° F. under atmospheric pressure. (See HEAT.)

Varieties of Coal. The several varieties of coal and their properties are as follows:

Anthracite often contains over 80 per cent of fixed carbon, and also little ash, sulphur, and moisture. It has great heating power, and burns with a smokeless flame. It is dense, has a shining lustre, and usually breaks with a smooth, conchoidal fracture. The largest supply of true anthracite is obtained from the great anthracite region of eastern Pennsylvania, where the quality of the coal is due to regional metamorphism. Several small fields occur in the West, and are partly the result of contact metamorphism. They include Crested Butte, Colorado; Routt County, northwestern Colorado: Cerillos, New Mexico; and a few others. A little is mined in western Canada.

Semianthracite is a variety between bituminous and anthracite, but more closely resembling the latter. It is but slightly developed in the United States, the main commercial supply coming from Sullivan Co., Pa., and being sold as anthracite. Some is found in the eastern part of the Arkansas field.

Semibituminous coal, also intermediate between anthracite and bituminous, more nearly resembles the latter. It is perhaps the best-known coal of the United States, and because of its ideal steaming qualities has a world-wide reputation. This type is produced in the fields known as Clearfield, Pennsylvania; George's Creek, Maryland; New River and Pocahontas of Virginia and West Virginia, and the Arkansas field. It is known in Colorado and some other Western States, but has not attained commercial importance.

Bituminous coal is a comparatively brittle coal, of deep-black color and often cubical fracture. It burns readily, with a smoky flame, and is much used for steaming purposes; indeed, the great bulk of merchantable coal of the United States belongs to this class. It includes most of the coal produced east of the Mississippi, as well as in Iowa, Kansas, Oklahoma, and Texas. Bituminous coal is also known in many parts of the Rocky Mountain province and the northern Pacific coast.

Cannel coal (q.v.) is a variety of coal very rich in volatile matter, and found sparingly in parts of Kentucky, Ohio, and Indiana. Its chief use is as a gas enricher, since it yields 8000 to 15,000 cubic feet of gas per ton. It is very compact in texture, and may even have an oily look.

Subbituminous coal or *black lignite* is a grade intermediate between bituminous and lignite, and sometimes difficult to distinguish from one or the other. It differs from the latter usually in having a black streak; from the former in that it cracks irregularly in drying or splits parallel to the bedding on weathering, while bituminous shows a columnar cleavage or jointing. Subbituminous coal is black, and often has a fair lustre. It is a common type in many of the Western coal fields.

Lignite or *brown coal* is the lowest grade of true coal. It often shows a woody structure, brown color and streak, and high moisture content. On drying out it usually cracks badly, and hence should be used near the point of production unless it is formed into briquettes or utilized in a gas producer.

Coking coal (see COKE). Some bituminous coals form a hard, more or less porous coke or cake when heated in the presence of little air. *Natural coke* or *carbonite* is sometimes formed when an igneous rock penetrates a coal seam, but such deposits are limited in extent and of no commercial value.

Structural Features. Coal beds are liable to thicken or thin out when traced from point to point. Others divide or split, perhaps only to reunite farther on. In regions of disturbance they may show folding and faulting. Several beds may occur one above the other, separated by varying intervals of barren rocks. The rocks associated with coal are usually shale and sandstone, but clays, conglomerates, and limestones are also known.

History and Use. The value of coal does not seem to have been known to the ancients, nor is it well known at what time it began to be used for fuel. Some say that it was used by the ancient Britons; at all events, it was an article of household consumption to some extent during the Anglo-Saxon period as early as 852 A.D. There seems to be reason for thinking that England was the first European country in which coal was used in any considerable quantities. In America the deposits near Richmond, Va., were discovered in 1701, and mining was begun in 1750, while anthracite was first produced in 1793. Extended coal mining in the United States did not really begin, however, until about 1820. Since that time up to the present the

increase has been very rapid. In 1822 the amount of coal mined in Virginia was about 48,000 long tons. Latterly the production for the United States has reached over 500,000,000 short tons, greater than that of any other country of the world.

Coal is used largely for domestic purposes, either as fuel or, in the form of gas, for illumination and fuel. Its use for the latter purposes is, however, not so widespread as formerly, water gas having superseded it to a considerable extent. In the production of steam for motive power it also finds important applications. It is furthermore widely employed in the metallurgical industry in the form of either coal or coke, and in this connection may serve both as a fuel and as a reducing agent. Coke is made only from bituminous coal. Lignite seldom has much value as a fuel, owing to the large percentage of moisture that it contains. Because of this moisture it tends to crack in drying, and must therefore be used soon after mining, and in localities where it does not require long transportation from mine to market. This is true, for instance, of some of the lignite deposits in Colorado which are near the Denver market, and therefore possess commercial value. Lignite has sometimes been successfully used in the manufacture of producer gas, and peat has been found adaptable for this purpose. It has been suggested that much lignite could be used in the form of briquettes.

Coal Areas. The leading coal-producing countries of the present day are the United States, Great Britain, Germany, Austria-Hungary, France, Russia, and Belgium. The Russian coal fields are probably the most extensive in Europe. In the Far East coal is known in India, the Malay Archipelago, Japan, and China. The coal fields of China are very large and may become a source of European supply. Up to the present time they have not been developed in a systematic manner. Italy, Spain, Sweden, Australia, New Zealand, Borneo, the Philippine Islands, and some countries in Africa also produce coal; while in America, outside of the United States, deposits are worked in Canada, Mexico, Chile, and Argentina, and are known to occur in Colombia and Peru.

United States. The coal fields of the United States are especially extensive, the total area of the known fields exceeding 300,000 square miles, as shown by the accompanying table.

The American coal fields are separable into several provinces, the divisions being geographical and not geological. The geological ages of the coals in 1 and 2 are all Carboniferous, except small Triassic areas in Virginia and North Carolina. Those of 3, 4, and 5 are Cretaceous and Tertiary.

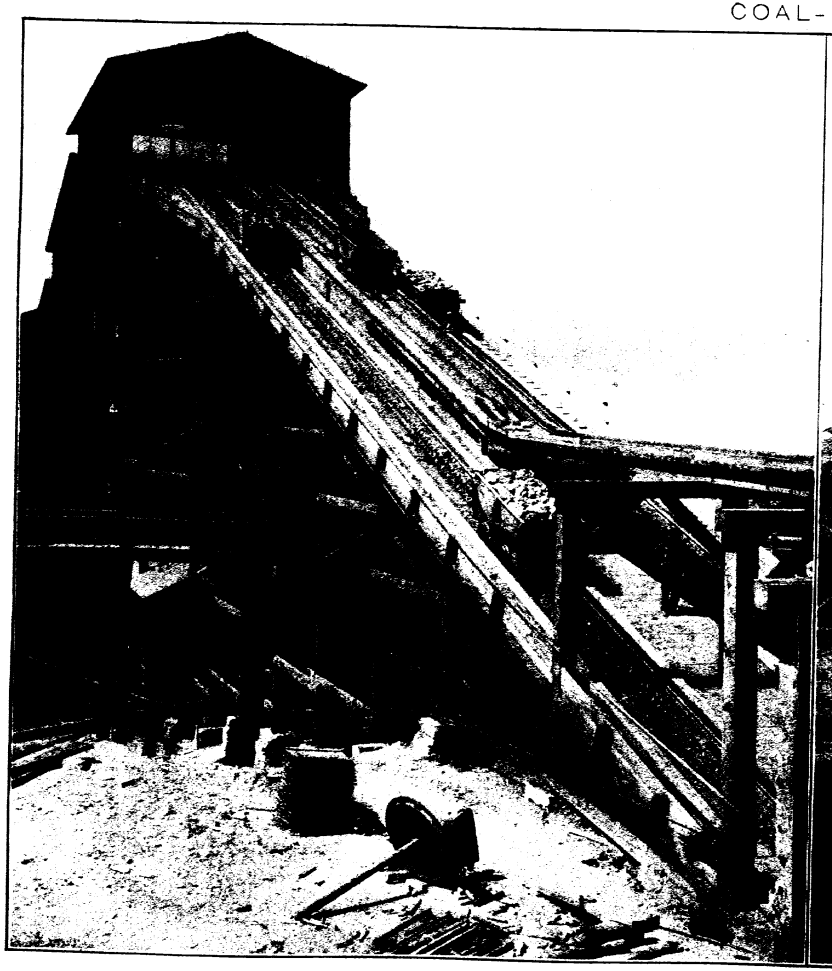
By far the most important of these regions is the Appalachian, which takes in portions of Pennsylvania, Ohio, West Virginia, Virginia, Maryland, eastern Kentucky, eastern Tennessee, Georgia, North Carolina, and Alabama. It is about 750 miles long and 70 to 80 miles wide. The coals are all bituminous or semibituminous with the exception of those at the northeastern end, in Pennsylvania, where close folding of the rocks has changed the bituminous into anthracite coal. In general, the rocks at the upper or northern end of the Appalachian belt are folded, while those of the lower end, as in Alabama, are often faulted in addition, so that the coal miner frequently finds the coal seam suddenly broken off. The Carboniferous section of this region has been described in the article CARBONIFEROUS SYSTEM, from which it may be seen that the coal beds occupy more or less well-marked stratigraphic positions.

COAL FIELDS OF UNITED STATES

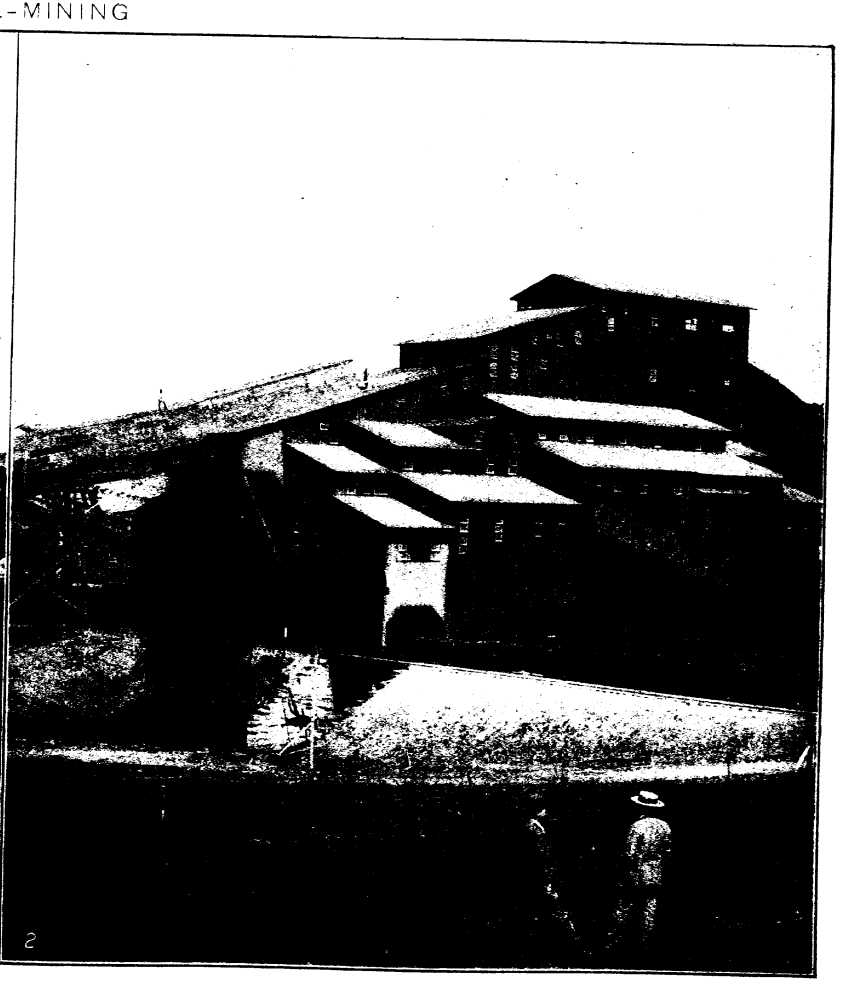
PROVINCE	State	Area of Known Fields sq. m.	Total
1. Eastern	Pennsylvania, anthracite	480	
	" bituminous	14,200	
	Ohio	12,660	
	Maryland	455	
	West Virginia	17,000	
	Kentucky	10,270	
	Virginia	1,900	
	North Carolina	60	
	Tennessee	4,400	
	Georgia	167	
	Alabama	8,373	69,965
2. Interior	Michigan	11,000	
	Indiana	6,500	
	Kentucky	4,900	
	Illinois	35,600	
	Iowa	12,560	
	Missouri	23,960	
	Kansas	18,600	
	Oklahoma	10,000	
	Arkansas	1,580	
	Texas	8,200	132,900
3. Gulf	Arkansas	100	
	Texas	2,000	2,100
4. Northern, or Great Plains	North Dakota	29,630	
	South Dakota	2,160	
	Montana*	38,265	
	Wyoming†	11,120	
	Colorado	6,455	
	New Mexico	960	88,590
5. Rocky Mountain	Montana‡	260	
	Idaho	230	
	Wyoming‖	9,540	
	Colorado	7,886	
	Utah	3,646	
	New Mexico	12,260	
	Arizona	3,610	37,432
6. Pacific Coast	Washington	1,800	
	Oregon	90	
	California	10	1,900
			332,887

* Bituminous and subbituminous areas of northern and eastern Montana.
† Bituminous and subbituminous areas of northeastern Wyoming.
‡ Coal fields in the mountainous districts of Montana.
‖ Coal fields in the mountainous districts of Wyoming.

Appalachian Field. The coal measures of the Appalachian field consist of a great thickness of overlapping lenses of conglomerate, limestone, shale, fire clay, and coal. A fairly uniform succession of beds is identifiable in Pennsylvania, Ohio, Maryland, and West Virginia, but the section is less uniform in the Southern States. Coking coal is found throughout the field, but most of it is made from coals on the eastern border, for the coking qualities seem to disappear towards the western margin. Coking coals of high quality are found in the Connellsville district in Fayette and Westmoreland counties of southwestern Pennsylvania. Excellent steaming coals are mined in Clearfield, Allegheny, and Washington counties of Pennsylvania; in the Hocking district of Ohio; in northern West Virginia, and in the Pocahontas district of south-



INCLINED PLANE FROM MINE TO BREAKER.



2. VIEW OF TYPICAL BREAKER.

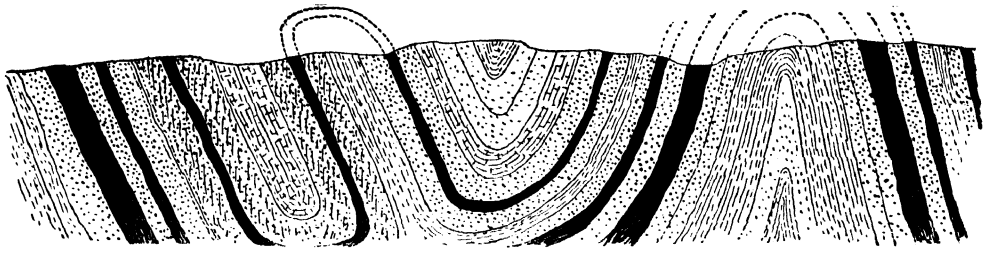
west Virginia, the latter being known as smokeless, as well as coking. Other well-known grades are the Youghiogheny gas coals of southwestern Pennsylvania, the Cumberland smithing coal of Maryland, the Kanawha splint and gas coals, the Massillon domestic coal of Ohio, etc. The anthracite district of Pennsylvania occupies an area of about 470 square miles. The strata between Pottsville and Wyoming, which belong to the lowest portion of the coal measures, are probably about 3000 feet thick; but it is difficult to make an exact estimate, because of the numerous folds and contortions. There are from 10 to 12 seams, each over three feet in thickness. The principal one, known as the Mammoth or Baltimore vein, is 29 feet thick at Wilkes-Barre, and in some places exceeds even 60 feet.

Michigan Field. The Michigan area is a small one in the lower peninsula of Michigan. It forms a circular basin with a diameter of about 50 miles. The coals are bituminous, mostly noncoking, and are mined chiefly for local use. The seams range from a few inches to 3 feet in thickness.

of the Colorado areas, and bear a good reputation, as do also many of the Wyoming coals. California has little fuel of good quality, and has for many years drawn on Australia for its coal supply, but in recent years the coals of Oregon, Washington, and British Columbia have become a source of supply.

The rocks of the small Rhode Island area have been so highly metamorphosed that the coal has been altered to graphitic anthracite. It is sold on the market as amorphous graphite, and has little value as a fuel.

Canada. The Acadian field includes deposits in Nova Scotia and New Brunswick, the former being quite important. The coals are bituminous, sometimes of coking character and of good quality. Extensive deposits of lignite and subbituminous coal are found in the Great Plains area of Saskatchewan and Alberta. In the mountain ranges of Alberta and British Columbia extensive coal seams have been discovered, and they are now under development. Semianthracite is mined near Banff, Alberta. A good quality of coke is made from the coal of Crow's Nest Pass, which finds a market at the British Columbian



CROSS SECTION OF ANTHRACITE COAL MEASURES (PENNSYLVANIA).

The Eastern Interior region of the central province includes parts of western Kentucky, Indiana, and Illinois, and lies chiefly within the latter State. These coals are all bituminous, of Carboniferous age, and are used chiefly for steaming. Many are coking, but do not yield a sufficiently high-grade coke to compete with the eastern product. The thickness of the Carboniferous system varies from 1200 to 1400 feet in southern Illinois, to about 600 feet in Indiana, and the workable coal seams vary in number from 7 to 12 in Illinois, and their thickness from 3 to 8 feet. The "block coal" of Indiana, so called because of its peculiar jointing, is very pure, dry, and noncoking. The western central region includes Iowa, Missouri, Arkansas, Oklahoma, Kansas, and part of Texas. Here again there is an abundance of bituminous coal. That of Iowa is mostly low grade, noncoking, but has fairly good steaming qualities. Some of the Kansas coal is coking, and Arkansas produces both bituminous and semianthracite.

The Cordilleran Region comprises the coal regions of Colorado, New Mexico, Utah, Wyoming, North Dakota, Montana, California, Oregon, Washington, and Alaska. In these fields are found many varieties grading between lignite and anthracite. They are all of either Tertiary or Cretaceous age excepting some in Alaska. Colorado is perhaps the most important producer, having a number of good bituminous seams. Those in the vicinity of Crested Butte have been changed locally to anthracite by the metamorphic action of igneous intrusions. Excellent coking coals are found near Trinidad. The New Mexican coals are in part an extension

smelters. Bituminous coals are worked near Nanaimo on Vancouver Island as well as at other points.

Europe. Commercially valuable deposits of coal are found in practically all the independent political divisions of Europe, but in some, as Switzerland, the reserve is nearly exhausted. Indeed in Europe as a whole the duration of the coal supply, considered in the light of the present output, is a matter of serious consideration. The principal anthracite fields are those of the Donetz basin in Russia and the Welsh fields of Great Britain, both being of Carboniferous age. The Belgium-German basins contain the largest reserves of bituminous coal, also of Carboniferous age, but they are not as easily exploited as the British fields, from which consequently a larger percentage of reserves can be extracted. A large proportion of the brown coal of Europe is of Tertiary age, the principal fields being those of Germany, Austria, and southern Russia.

South America. The fields supplying the best quality of coal are those along the Pacific coast and the Gulf of Mexico, the deposits being usually of Tertiary age. These latter occur in the coastal belt of southern Argentine, Chile, and in the mountain districts of Peru, Ecuador, Colombia, and northern Venezuela. Permo-Carboniferous coals are known east of the Andes, outcropping in southern and eastern Brazil, and underlying part of Uruguay as well as possibly a large part of Argentina.

Other Countries. The coal reserves of Asia are large, though not to be definitely estimated, as the Siberian and Chinese coal fields are in-

sufficiently explored. Those of China and India are probably Permo-Carboniferous, those of Japan, Tertiary, and those of Siberia, Lower Carboniferous to recent. In Africa the coal reserves are practically confined to the southern part of the continent. Coal deposits, especially those of Tertiary age, are widely distributed in the islands of Oceania, but New South Wales is the only producer of importance.

Coal Reserves. The accompanying table, compiled under the direction of the International Geological Congress in 1913 gives a careful estimate of the actual coal reserves of the world based on observations and calculations of the geologists in the different countries.

ESTIMATE OF COAL RESERVES OF THE WORLD IN MILLION TONS

CONTINENT	Anthracitic coals, including some dry coals	Bituminous coals	Subbituminous, Brown coals, Lignites	Totals
Oceania	659	133,481	36,270	170,410
Asia	407,637	760,098	111,851	1,279,586
Africa	11,662	45,123	1,054	57,839
America	22,542	2,271,080	2,811,906	5,105,528
Europe	54,346	693,162	36,682	784,190
	496,846	3,902,944	2,997,763	7,397,553

Output. The world's annual production at the present time is about 1,300,000,000 short tons; the output of the more important countries in the latest year for which statistics are in most cases available, according to *The Mineral Resources*, was distributed as follows:

COUNTRY	SHORT TONS
United States (1912)	534,466,580
Great Britain (1912)	291,666,299
Germany (1912)	285,974,649
Austria-Hungary (1911)	54,960,298
France (1911)	43,242,778
Russia (1911) and Finland	29,361,764
Belgium (1911)	25,411,917
Japan (1911)	19,436,536
China (1911)	16,534,500
India (1911)	13,494,573
Canada (1911)	11,323,388
New South Wales (1911)	9,734,596
Spain (1910)	4,472,618
Transvaal (1911)	4,343,680
Natal (1911)	2,679,551
New Zealand (1910)	2,461,045
Mexico (1910)	1,653,450
Holland (1911)	1,628,097
Asiatic Russia (1910)	1,371,261
Chile (1911)	1,277,191
Queensland (1911)	998,556
Bosnia and Herzegovina (1911)	848,510
Turkey (1911)	799,168
Total	1,358,141,005

It is interesting to follow the progress of the United States as a coal producer. In 1868 Great Britain produced 3.6 times as much coal as the United States, while Germany's product that year was 15 per cent greater than that of the United States. In 1871 the United States exceeded Germany's output by about 10 per cent, but afterward fell back to third place until in 1877 she once more sprang forward, and gained on both Germany and Great Britain. In 1899 the United States led the world, and in 1912 supplied 39 per cent of its production.

The following figures published by the United States Geological Survey give a clear idea of the importance of the industry at the present time (1912):

United States production in short tons:	
Anthracite	84,446,174
Bituminous	412,781,000
Semibituminous	19,072,990
Lignite and subbituminous	9,512,100
Semianthracite	1,376,714
Block	704,791
Splint	6,058,779
Cannel	514,032
Total United States production	534,466,580
Value of same	$695,606,071
Bituminous coal mined by machines, short tons	210,538,822
Average per cent of all mined	46.8
Quantity of coal washed, short tons	19,844,517
Yield of washed coal, short tons	17,538,572
Average number of men employed mining coal	722,662
Coke produced in United States, short tons	43,983,599
Value of same	$111,736,696
Coal exported from United States, short tons	20,326,619
Coal imported into United States, short tons	1,800,415
Briquettes made in United States, short tons	220,064
Value of same	$952,261

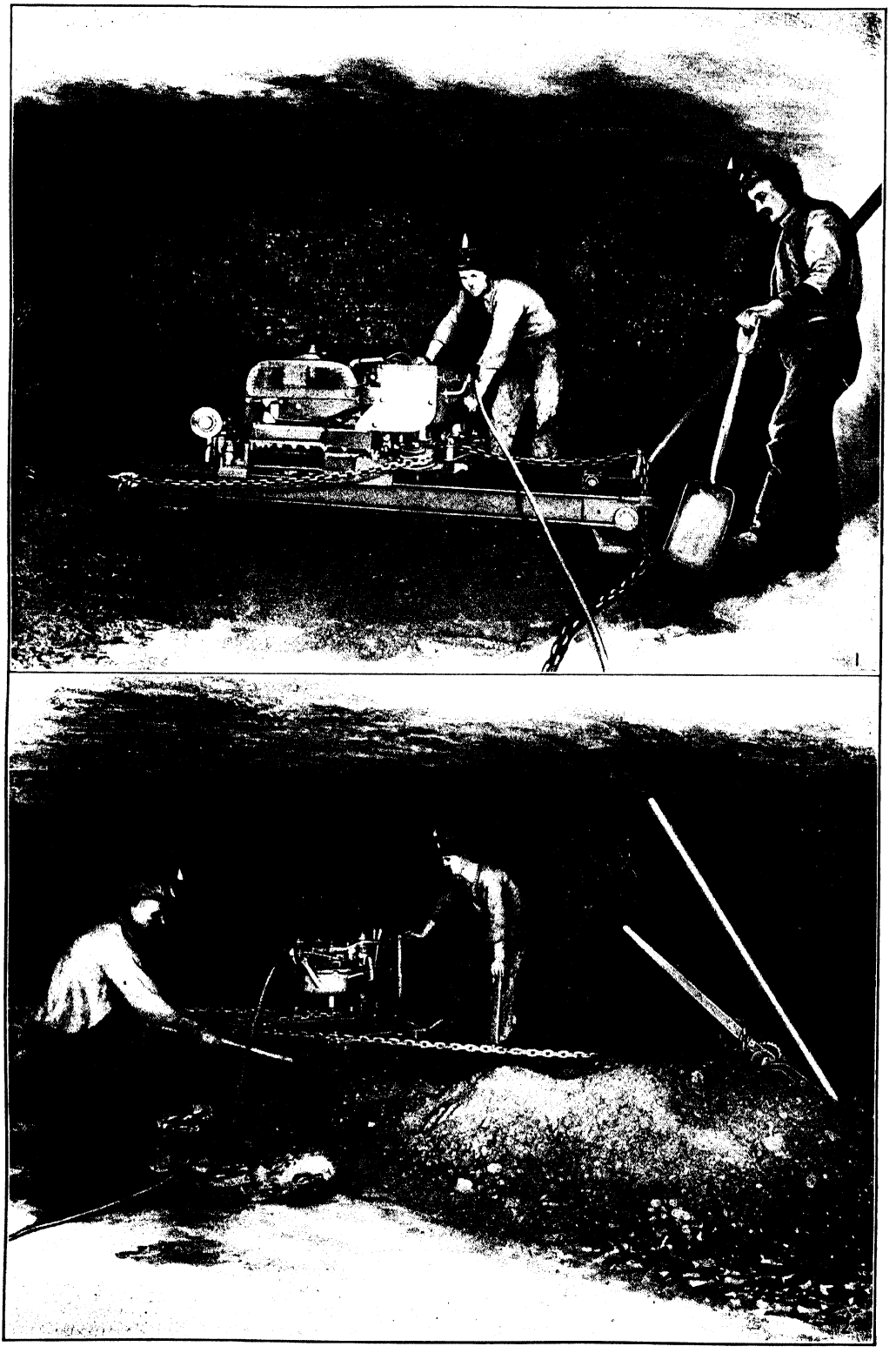
Mining of Coal. The presence of coal in paying quantities having been determined by prospecting and geological surveys, the next consideration is to extract this coal from seams. No definite rules can be given for the selection of a method of mining that will cover all conditions; each mine furnishes a distinct and separate problem. Every system of mining, however, aims to extract the maximum amount of the deposit in the best marketable shape and at a minimum cost and danger. Speaking broadly, all methods of mining come under the head of either open working or closed working. Open working is employed when the deposits have no overburden of barren rock or earth, or where this overburden is of such small depth that it can be easily and cheaply removed, leaving the coal deposit exposed. The mining of such exposed seams of coal is really a process of excavation or quarrying, and the machines used in making open-pit excavations and in quarrying are applicable to the work. Closed working is adopted when the depth of the overburden is so great that the mining must be conducted underground. The first task in opening up underground coal seams is to secure access to the seam by means of shafts, slopes, or tunnels. Shafts are vertical openings from the ground surface to the coal seams. In the United States shafts are usually made square or rectangular in form. This practice is largely due to the fact that timber is used for lining shafts. In Europe round or oval shafts are frequently employed with linings of brick, iron, or masonry.

Generally the shafts are divided into two or more compartments, one of which contains a ladder, compressed-air pipes, etc., while in each of the remaining is installed an elevator for hoisting the coal cars to the surface. The number of compartments in a shaft and their arrangements depend upon the particular use to which the shaft is to be put, the number of shafts employed, and their depths. Where the seams are comparatively near the surface, it is usually cheaper to sink a number of two or three compartment shafts than it is to haul all the ore to one large shaft; while, when the shafts are very deep, it is preferable to sink a smaller number of four or six compartment shafts and extend the underground haulage to a single shaft over a great area of the workings. Where timber lining is employed, a stronger construction is obtained by placing the compartments side by side in a long, narrow shaft than by grouping them in a square shaft. In shallow mines separate shafts are often em-

COAL–MINING



1. THE OLD WAY– Miner working with hand pick.
2. THE MODERN WAY– The machine cutter. The Jeffrey motor turret coal cutter cutting a break-through in a shale band.



1. SULLIVAN ELECTRIC CHAIN MACHINE, Making "tight" or corner cut.

2. SULLIVAN ELECTRIC CHAIN MACHINE, Cutting across face of room.

ployed for hoisting and for pumping, ventilation, and ladder ways. One of the largest coal-mine shafts in America is situated at Wilkes-Barre, Pa.; it is 1039 feet deep, 12 × 52 feet in size, and has five compartments. The methods of sinking mine shafts are essentially the same as those used in sinking shafts for tunnels. (See TUNNEL.) Slopes are openings begun at the outcrop of an inclined seam, which they follow down into the earth. Slopes are usually made with three compartments side by side, two of which are used as hoistways and the third for the traveling way, piping, etc. When the dip of the slope is under 40 degrees the slope is made about 7 feet high, but when the dip exceeds 40 degrees cages have to be used and a great height is necessary. Slopes are usually lined with timber. Tunnels are nearly horizontal passageways beginning on the side of a hill or mountain and extending into the earth until they meet the coal seam; they are built for both haulage and drainage purposes, and are constructed like railway tunnels, except that the cross section is usually much smaller, and that it is lined with timber instead of with permanent masonry. The forms of timbering used in coal mining are various, and are of interest chiefly to the practical miner; special treatises should be consulted by those interested in the details. In a general way, it may be said that timber used for underground support in mines should be of a light and elastic variety of wood. Oak, beech, and similar woods are heavy and have great strength, but when they do break it is suddenly and without warning, thus bringing disaster to the miners who might escape if a tough wood were employed which gives warning of rupture by bending and cracking. It is a very common practice to employ preserved timber in mining work. Steel frames as means of support have several advantages and have met with considerable favor. They are very strong and compact, and their fireproofing qualities are of great importance in a coal mine.

The systems of working the coal seams after access is attained to them by the means described are two, known as the room-and-pillar and the long-wall systems. The room-and-pillar method—also known as the pillar-and-chamber or board-and-pillar method, which may include the pillar-and-stall system—is the oldest of the systems, and the one very generally used in the United States. By this system coal is first mined from a number of comparatively small places, called rooms, chambers, stalls, boards, etc., which are driven either square from or at an angle to the haulageway. Pillars are left to support the roof. In the long-wall method the whole face of the coal seam is taken out, leaving no coal behind, and the roof is allowed to settle behind as the excavation progresses, care being taken to preserve haulageways through the falling material. Both the room-and-pillar and the long-wall methods are employed in various modifications, for the details of which special treatises on coal mines should be consulted. The coal is cut from the seam by hand or by some form of coal-cutting machine. In America machine cutting is used extensively. There are four general types of machines in general use: Pick machines, chain-cutter machines, cutter-bar machines, and long-wall machines; the machines most used in America are pick machines and chain-cutter machines. Both compressed air and electricity are used for operating coal-cutting machines. Pick machines are very similar to a rock drill; chain-cutter machines consist of a low metal bed frame upon which is mounted a motor that rotates a chain to which suitable cutting teeth are attached. The ventilation of the workings is a very important feature of coal mining, owing to the presence of gases peculiar to coal formations. One of the most common of these is marsh gas, CH_4, which is very explosive if mixed with the right proportions of air. This mixture is what the coal miner calls "fire damp." Other gases found in coal mines and dangerous in one way or another are carbonic-acid gas, CO_2 (called "black damp" or "choke damp"), sulphureted hydrogen, H_2S ("stink damp"), and carbon monoxide, CO ("white damp"). "After damp" is a gas present after an explosion of gas in the mine and is very dangerous. Besides these gases it has been proved in recent years by the United States Bureau of Mines that finely divided coal dust is well able to cause a violent and disastrous explosion. Therefore great care is taken to lay out the workings so as to facilitate ventilation, and mechanical ventilation by means of fans and blowers (see BLOWING MACHINES) is usually employed. On account of these gases many miners have to use safety lamps (q.v.) for illumination, these lamps being so constructed that the flame does not come in contact with the air and gas in the mine workings.

Hoisting in mines is accomplished by means of cages, as the elevators are called, running up and down the shafts, and operated by large hoisting engines on the surface. There are two general systems of hoisting in use—hoisting without attempt to balance the load, in which the cage and its load are hoisted by the engine and lowered by gravity, and hoisting in balance, in which the descending cage or a special counterbalance assists the engine to hoist the loaded ascending cage. Haulage in mines is accomplished by animal power or by steam-hoisting engines operating a system of rope haulage or by mine locomotives operated by steam, electricity, compressed air, or gasoline.

The preparation of mined coal for the market consists in screening the coal over bars and through revolving or over shaking screens, together with breaking it with rolls to produce the required market size. The large lumps of slate or other impurities are separated by hand, while the smaller portions are picked out by automatic pickers or by hand by boys or old men seated along the chutes leading to the shipping pockets or bins. When coal contains much sulphur, this is frequently removed by washing it with water in special washing plants.

Bibliography. OCCURRENCE. Lesley, *Manual of Coal and its Topography* (Philadelphia, 1856)—a classic work, but hard to obtain; Ries, *Economic Geology* (3d ed., New York, 1910); Macfarlane, *The Coal Regions of America: Their Topography, Geology, and Development* (New York, 1875); *The Coal Resources of the World*, issued by International Geological Congress (Ottawa, 1913). The United States Geological Survey has issued a number of bulletins dealing with the different coal areas. Special reports have also been issued by the Canadian Geological Survey (Ottawa) and the State Geological Surveys of Pennsylvania (second survey), Maryland, West Virginia, Virginia, Georgia, Kentucky, Ohio, Illinois, Indiana, Michigan, Alabama, Arkansas, Oklahoma, Texas, Iowa, Missouri, Kansas, Washington, North Dakota, and

Montana. MINING AND TECHNOLOGY. Hughes, *A Text-Book of Coal Mining* (London, 1904); Peel, *Elementary Text-Book of Coal Mining* (London, 1911); *Coal and Metal Miner's Pocketbook* (Scranton, 1907); Kerr, *Practical Coal Mining* (5th ed., London); Cockin, *Practical Coal Mining* (London, 1913); see also bulletins and technical papers issued by Bureau of Mines, Washington. MAGAZINES. The following contain many scattered papers: *Engineering and Mining Journal* (New York); *Mining and Scientific Press* (San Francisco); *Mines and Minerals* (Scranton); *Mining Magazine* (London); *Zeitschrift für praktische Geologie* (Berlin); *Annales des Mines* (Paris). For special information see ANTHRACITE; BITUMINOUS COAL; CARBONIFEROUS SYSTEM; COKE; CULM; CRETACEOUS SYSTEM; PEAT; TERTIARY SYSTEM; GRAPHITE; CARBON; FIRE CLAY; and the articles on the different States and countries in which coal has been found.

COAL APPLES. The name given to some curious specimens of spheroidal anthracite coal found in the Mammoth seam of Pennsylvania. They vary from one-fourth inch to 10 inches in diameter, but are usually about the size of a hen's egg. They are thought to be due to jointing.

COAL BREAKER. A structure containing machinery for the purpose of crushing, sorting, and cleaning anthracite coal. The breaker is often as much as 150 feet high and rarely less than 80 feet. The coal, as it is hoisted out of the mine, is carried up to the top of the breaker and discharged into a hopper, whence it passes downward over bars, through screens and crushers, and is finally discharged into bins at the bottom. The admixed slate is separated partly by special screens, and the slaty coal (bone coal) is picked out by boys as it slides down the chutes. In the more modern breakers water jigs are used very successfully to separate the slate and coal. The sizes produced are described in the article on ANTHRACITE. The capacity of a coal breaker is commonly about 1000 tons per day, but some exceed 2000 tons in output. Consult Chance, "Report on Coal Mining," *Report AC of the Second Geological Survey of Pennsylvania* (Harrisburg, 1883).

COAL CITY. A village in Grundy Co., Ill., 60 miles southwest of Chicago, on the Atchison, Topeka, and Santa Fe, the Chicago and Alton, and the Elgin, Joliet, and Eastern railroads (Map: Illinois, D 2). Coal is mined, and there are manufactories of brick and tile and clothing. Pop., 1900, 2607; 1910, 2667.

COALDALE. A borough in Schuylkill Co., Pa., 15 miles northwest of Pottsville, on the Lehigh and New England, and the Central of New Jersey railroads (Map: Pennsylvania, K 5). It contains the Panther Valley Mining Institute. The borough is in a productive coal-mining region. Pop., 1910, 5154.

COALFISH (so named from its color). 1. The pollack (q.v.). 2. A singular and interesting chirid fish (*Anoplopoma fimbria*) of the North Pacific, which is usually slaty-black above and white below, but variable with age and place. It is about 18 inches long, allied to the rock trout, and called in California beshow, candlefish, and skilfish.

COAL GAS. See GAS, ILLUMINATING.

COALGATE. A town and the county seat of Coal Co., Okla., 120 miles by rail southeast of Oklahoma City, on the Missouri, Kansas, and Texas and the Chicago, Rock Island, and Pacific railroads (Map: Oklahoma, E 4). The chief industries are coal mining and cotton raising. The water works are owned by the town. Pop., 1900, 2921; 1910, 3255.

COALINGA. A city in Fresno Co., Cal., 98 miles by rail west of Fresno, on the Southern Pacific Railroad (Map: California, E 6). It contains a Carnegie library and fine grammar and high school buildings. Coalinga is practically surrounded by oil wells. In 1912 the production of petroleum in the region was 18,803,292 barrels, and there are now 1327 producing wells in the entire field. The city has eight oil-field supply houses, a refinery, and several machine shops. One of the unique features of Coalinga is the direct supply, through pipe lines to the houses, of distilled water. Pop., 1900, 300; 1910, 4199.

COALING SHIP. One of the most important matters connected with modern naval war is the supply of fuel. In the United States navy this is usually provided by naval fuel ships, but in certain home ports, and occasionally elsewhere, both coal and fuel oil are brought alongside in barges carrying from 200 to 1000 tons. Notwithstanding all that can be done in the way of drill and improved appliances, the operation of coaling a large war vessel requires from 10 to 20 hours if the coal is taken from barges, and about half as long if supplied by one of the new-type fuel ships. From a collier of the older type the time required is considerably greater. Fuel oil, being pumped on board, requires little or no labor and much less time. The loss of time required to coal the vessels of a fleet, even if performed in the most expeditious manner, may seriously interfere with the operations of war. Under existing conditions coaling can be effected only in comparatively smooth water, either at sea or in a protected harbor or roadstead, and requires the vessels to remain at rest or to proceed at a very low rate of speed. Means for coaling at sea, while steaming at a moderate rate of speed on any desired course, have therefore been sought, but those so far designed have not proved very successful. The plan which has given the best results requires the battleship or collier to take the other in tow, the vessel in tow operating her engines to reduce the towing strain to a point which will just keep the lines taut. The coal, in large bags, is hoisted to a point high on the fuel ship's mast, where the bags are hooked to a trolley running on a large wire rope which extends to the other ship. While this method of supplying coal is not regarded with much favor, it is quite probable that oil could be pumped aboard from a ship in tow without great difficulty. See FUEL SHIP.

COALING STATION. See NAVAL STATION.

COAL-LAND FRAUDS. See ALASKA.

COAL MEASURES. See COAL; CARBONIFEROUS SYSTEM.

COAL OIL. See PETROLEUM.

COAL TAR, or GAS TAR. During the process of manufacturing illuminating gas from soft coal, a thick, oily, black liquid collects in the hydraulic main and condensers of the gas works. This is coal or gas tar. It is slightly heavier than water and has a strong, disagreeable odor. Coal tar is a complex mixture of substances, and the separation of its components constitutes one of the most important branches of manufacturing chemistry. It is the only source of innumerable compounds of the greatest value to science and the industries.

By fractional distillation the tar is first

broken up into groups of substances—principally hydrocarbons, phenols, and bases—which are further distilled or otherwise treated. The original fractions, or distillates, vary according to the composition of the tar or the market demand, but the following is an average separation:

1. *"First Runnings" or First Light Oil.* This fraction is collected up to 105° C., and contains water, ammonium salts, the more volatile oils, and a small amount of the heavier oils carried over mechanically. 2. *Light Oil.* The distillate between 105° C. and 210° C. is taken as light oil. It is again distilled and the fraction up to 170° C. forms crude naphtha; above 170° C. the running is put with the next main distillate, the carbolic oil. The crude naphtha is treated with alkali and acids to remove phenols, thiophene, unsaturated hydrocarbons, and pyridines. On further distillation the naphtha yields "90 per cent benzol" up to 110° C., "50 per cent benzol" from 110° C. to 140° C., and "solvent naphtha," or "benzine," from 140° C. to 170° C. The "90 per cent benzol" contains about 70 per cent pure benzene, 24 per cent toluene, and xylene. The 50 per cent benzol contains about 46 per cent benzene. Benzene is the basis for the manufacture of many compounds, notably aniline and its derivatives. It is also used as a solvent. The fraction known as "solvent naphtha," or "benzine," contains xylenes, cumenes, and other higher homologues of benzene. It is used as a solvent for rubber and resins and is also employed to enrich illuminating gas. It is a grease remover, but is not identical with petroleum benzine, also used for this purpose. 3. *Carbolic Oil* is collected between 210° C. and 240° C. It contains phenols and naphthalene. The phenols yield carbolic acid, of powerful antiseptic properties, and the source of many dyes, explosives, and medicines. Naphthalene separates from the carbolic oil as a crystalline mass. It is one of the most important constituents of coal tar and is used extensively as moth-ball camphor and in the preparation of dyes and medicines. 4. *Creosote Oil.* From 240° C. to 270° C. a small amount of distillate is received which contains some naphthalene, together with cresol, naphthol and liquid paraffin. After the removal of the naphthalene its principal use is for preserving timber and railroad ties and as a vermin destroyer. (See CREOSOTE.) 5. *Anthracene,* or *Green Oil,* is collected above 270° C. This fraction contains anthracene, the most valuable constituent of coal tar. It crystallizes out from the oil, is purified, and is extensively employed in the manufacture of the beautiful alizarin dyes, which were formerly made from madder root. See ALIZARIN.

The *Pitch* remaining in the stills after the above fractions have passed over is used in making asphalt, varnishes, tarred paper or roofing paper, and as a cement to bind together soft coal dust as "briquettes" for fuel.

Coal tar in its crude form finds some use as a protective paint, in the preservation of timber, and in making tarred paper. See COAL-TAR COLORS; GAS, ILLUMINATING; and see the articles on the various products mentioned above.

COAL-TAR COLORS. Coloring matters artificially prepared from coal tar, chiefly from the hydrocarbons extracted from it. (See COAL TAR.) The first observation of a colored compound of this class was made by Runge in 1834; but the real beginning of the great modern color industry dates from 1856, when W. H. Perkin obtained a violet dyestuff by oxidizing impure aniline with chromic acid, took out a patent for it, and commenced manufacturing it in England. Many other dyes were subsequently obtained from aniline and the substances related to it, by A. W. Hofmann, Gries, Girard, Lauth, and many others. But the most sensational step was the preparation by Graebe and Liebermann (1868) of a natural dyestuff, viz., the coloring principle of madder root, from the anthracene of coal tar. In 1880 indigo was first prepared, not from coal-tar products, but by a purely synthetic method, and other natural colors have since been prepared in a similar manner; so that natural dyestuffs reproduced by artificial means need not necessarily originate from coal tar. The artificial indigo and alizarin are not mere substitutes for the natural indigo and madder; they are chemically identical with them and surpass them in purity, and their adaptability to special methods in dyeing and printing makes them even more desirable. The color industry was first developed in England and France, but the more thorough technical instruction at the German universities produced a body of skilled manufacturers and investigators who soon took the lead. At present, in addition to the great factories near Berlin, Frankfurt, Elberfeld, and Mannheim, and a host of smaller ones in various parts of Germany, German capital controls many of the establishments in France, Russia, and other countries. The United States possesses few independent factories, and the list of their products is rather limited; indeed, American dyers appear to call for a smaller range of dyestuffs than those of other countries. A peculiar modern development has been the extension of the methods of the dye industry to the production of artificial drugs, such as antipyrin, antifebrin, etc., many of which are manufactured in the same establishments which control the dye patents.

Classification. Artificial colors were formerly classified merely according to the sources from which they were obtained. Thus, many of them, including magenta, "aniline blue," "aniline green," "aniline yellow," etc., were grouped together as *aniline colors.* At present somewhat different systems of classification are used by different authors, but all systems are based exclusively on the chemical constitution of the dyes.

Many attempts have been made to find a general answer to the question, What must be the chemical nature of a carbon compound in order that it may be a dye? An all-embracing answer to this question has not yet been found. But experience has shown that the true dyestuffs exhibit peculiar groupings of the constituent atoms. Such "chromophore" groupings produce, however, only a *tendency* towards color, but not necessarily colors; indeed, many compounds containing them are perfectly colorless, and the majority of true dyes become colorless if deprived of the small amount of oxygen they contain, although their chromophore groups may not be in the least affected. If, however, a chromophore group is combined with certain other atomic groups known as auxochromes, the result is a dye. For example, the so-called *azo group* (—N=N—) is chromophoric; the compound called azobenzene, $C_6H_5—N=N—C_6H_5$, although colored red and evidently containing the azo group, is not a dye; but it becomes one when the so-called amido group (NH_2) also i

introduced into its molecule, the compound $C_6H_5 - N = N - C_6H_4NH_2$, called amidoazobenzene, being a true dye. If, instead of the amido group, a hydroxyl group (OH) is introduced, the result is again a dye (an orange one). Further, the tints of dyes are produced by variation in the "substituting" groups which replace hydrogen in the primitive molecule. Thus, the introduction of the methyl group (CH_3) generally increases the violet tendency; the phenyl group (C_6H_5) produces bluish tints; the naphthyl group ($C_{10}H_7$) a tendency towards brown-red; etc. The relative position of the groups likewise plays a large part in the determination of color. But, as we have already observed, a definite and all-embracing rule does not exist. Frequently compounds must enter into combination with a base or an acid before they will fix themselves upon the fibre, and then the tints are frequently affected by the different bases or acids to a varying degree. For example, alizarin dyes red with the hydroxide of aluminum, and black with the hydroxide of iron.

For the purpose of the present sketch the coal-tar colors may be grouped in five classes: viz., the azo colors; triphenylcarbinol derivatives; quinone derivatives; diphenylamine derivatives; and indigo dyes.

Azo Colors. The characteristic compound of this class is azobenzene, $C_6H_5N = NC_6H_5$, already mentioned above. We have seen that the introduction of either NH_2 or OH in place of a hydrogen atom produces a coloring matter—yellow in the former, orange in the latter instance. Replacing either or both of the phenyl groups (C_6H_5) by more complex hydrocarbon groups deepens the tone (with a tendency towards the redder tints), increases the affinity for fibres, and diminishes the liability to fade. The earlier dyes of this class, such as "aniline yellow," "Bismarck brown," chrysoidin, etc., were singularly brilliant, but were not fast; whereas the browns and the many reds, ranging from scarlet to purple, which are now produced under the names of ponceaux or bordeaux, congos, quinoline red, etc., are exceedingly permanent. In manufacturing this class of dyes nitrous acid is allowed to act upon an ice-cold solution of the salt of any primary base (like aniline), and the "diazo salt" formed is allowed to act on another base or a phenol; an endless variety of combinations is thus possible.

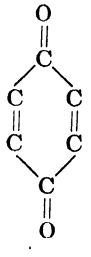
Triphenylcarbinol Derivatives. These represent the first discoveries in the aniline dyes, and some of them are still produced on the largest possible scale. The fundamental compound of the class is triphenylcarbinol $(C_6H_5)_3COH$, and its derivatives are properly subdivided into *rosanilines, rosolic acids,* and *phthaleins.*

In the rosaniline group two or three amido groups (NH_2) are introduced in place of hydrogen atoms of the phenyls (C_6H_5). The *di*amido compounds are green; the *tri*amido compounds are red, violet, or blue. Strictly speaking, the compounds thus obtained are not themselves dyes, but are bases which must first be combined with suitable acids and thus brought into a soluble form. Their salts are beautifully crystalline bodies in the solid condition, showing colors quite different from those of the solutions and having peculiar lustres like those of beetles' wings. The solutions have very intense colorations and stain animal fibres readily and permanently, although they do not fix themselves easily upon cotton or linen. They are the most brilliant and lively dyes, but are strongly affected by sunlight and are consequently less useful than some dyes of other classes. They are generally manufactured by oxidizing processes at a comparatively high temperature, whereby two or three simpler compounds are welded, as it were, into compounds of complex molecular structure. Thus, in the manufacture of the well-known magenta dye (a triamido compound) approximately equal quantities of aniline, orthotoluidine, and paratoluidine are heated from 8 to 10 hours with arsenic oxide to 190° C. in large iron kettles. A very thick mass results, which can be extracted with hot water, and the compound thus obtained is found to be made up of molecular quantities of aniline, orthotoluidine, and paratoluidine, chemically combined.

Rosolic acid and its derivatives are made by the condensation of various phenols, three phenols being condensed into one compound of the rosolic acid group, just as three bases are condensed into one compound of the rosaniline group. The comparatively few dyes of this group give various shades of red. The hydroxyl groups, and hence the acid character of the phenols, remain unchanged in the products of condensation; the latter therefore combine with bases and then they readily go into solution.

The phthaleïns differ from the rosolic acids in so far as one of the three phenyls of the triphenylcarbinol is connected in them with a carboxyl group (COOH), the other two phenyls having one or more hydroxyls apiece, as in the rosolic acids. The phthaleins were discovered by Adolph Baeyer and are chiefly remarkable for the fluorescence of their alkali salts in solution. They are prepared by heating phenols with phthalic anhydride and a little sulphuric acid; when resorcin is taken as the phenol a very well-known compound is obtained, which has been called *fluorescein,* while its sodium salt is known as *uranin.* Solutions of the latter are yellow, with a green fluorescence. This fluorescence is so intense that it is distinctly noticeable in extremely dilute solutions; so that this salt has been used to trace subterranean watercourses supposed to connect two neighboring bodies of water, the dye being thrown into one of these and fluorescence being subsequently noticed in the other. The potassium salt of a brominated fluoresceïn is *eosin,* $C_{20}H_6O_5Br_4K_2$, with a magnificent red and yellow fluorescence. The phenomenon of fluorescence is due to the action of light falling upon the solution. Some of the light rays, being reflected from the surface, carry one color to the eye; some are absorbed: some are emitted in the form of light waves with either a longer or shorter period than those which are absorbed, and thus produce a different color. Fluorescein and eosin emit shortened light waves.

The Quinone Derivatives. These contain the characteristic nucleus—



and are almost invariably colored, although they become suitable for dyes only when they also contain several hydroxyl groups. By far the most important substance of this class is alizarin (q.v.), which was already mentioned as identical with the active principle of madder. Anthracene (q.v.), a coal-tar hydrocarbon, is converted into anthraquinone by heating with potassium bichromate and sulphuric acid; the anthraquinone is acted upon by fuming sulphuric acid, and the resulting compound is melted with caustic soda, yielding a sodium salt of alizarin. This is soluble in water with a fine red color, but does not fasten upon any kind of fibre. If, however, cotton is previously impregnated with salts of aluminum, iron, or chromium, the alizarin will form insoluble salts ("lakes") with these metals; and as the precipitation occurs within the pores of the fibre, subsequent washing cannot remove it. Colors of this class of dyes are not suitable for silk and wool, but are very intense and permanent when properly applied to cotton.

The Diphenylamine Derivatives. These include many varieties of dyes, such as the indulins, indophenols, thiazins, etc. Their chemistry is too involved to be disposed of in a few words. It may, however, be mentioned that their characteristic groups are similar to anthraquinone, excepting that the oxygen of the latter is replaced by sulphur, imido groups, etc. The more important dyes of this class include "methylene blue" and "aniline black."

Indigo Dyes. By far the most important of these is indigo itself, a vegetable dye obtained from a tropical plant cultivated in India since the earliest times. The sap of this plant, when fermented under conditions excluding oxygen, yields *indigo white*, a soluble material having the formula $C_{16}H_{12}N_2O_2$; if the fermentation proceeds in the open air, *indigo blue*, $C_{16}H_{10}N_2O_2$, is produced. This substance is a derivative of the base called indol, C_8H_7N, which occurs ready formed, in small quantities, in many animal and vegetable secretions. It can be prepared artificially from aniline and chloraldehyde. When indigo was found to consist of two indol molecules joined together and oxidized, the clue for the production of artificial indigo was at hand. It has since been found that any benzene derivative having a nitrogenous group and a two-carbon group in the "ortho" position may give rise to the formation of indigo. The first practical method, devised by Baeyer in 1880, involved the action of potassium hydroxide on orthonitropropiolic acid; but many other methods have been devised since then, such as the action of melted potassium hydroxide on bromacetanilid, the action of halogenated acetone on aniline, etc. Indigo is one of the most reliable dyestuffs, both as to brilliancy and permanency in either its natural or its artificial form. The latter, however, gives a brighter shade than the average vegetable dye, being of uniform composition and free from the impurities of the natural indigo. Until recently, the finished compound could, however, only be applied after reduction to the soluble indigo white, and this made its use in dyeing and printing somewhat cumbersome. It was necessary to set up a fermentation vat in which the reducing action was allowed to continue for several days before the solution was in a form suitable for dyeing. At present rapid reduction is brought about by the use of sodium hydrosulphite in an alkaline bath, or the indigo may be purchased already reduced and ready for immediate dyeing in an alkaline solution. Indigo is still called a vat color, and many new dyes of great permanency have been placed on the market recently, which, like indigo, are applied in the modern alkaline hydrosulphite vat and are grouped in this class. See INDIGO.

List of Colors. The following are some of the best-known commercial coal-tar colors, their molecular formulas, and the principal methods employed in their manufacture.

Aldehyde Green. See Aniline Green below.

Alizarin, $C_{14}H_8O_4$, made artificially by successive treatments of anthracene with chromic acid and fuming sulphuric acid, and melting the product with potassium hydroxide. Among the dyes allied to alizarin are: *Alizarin Black*, $C_{10}H_6O_4.NaHSO_3$; *Alizarin Blue*, $C_{17}H_9NO_4$; *Alizarin Orange*, $C_{14}H_7NO_6$; and *Alizarin Violet*, or Galleïn, $C_{20}H_{10}O_7$.

Aniline Black, $C_{30}H_{25}N_3$, made by the oxidation of aniline with mineral salts.

Aniline Blue (triphenylrosaniline hydrochloride), $C_{38}H_{35}N_3Cl$, made by heating rosaniline, benzoïc acid, and aniline, and subsequently adding hydrochloric acid.

Aniline Brown, Bismarck Brown, or Phenylene Brown (triamidoazobenzene), $C_{12}H_{13}N_5$, made by the action of nitrous acid on metaphenylenediamine.

Aniline Green, or Aldehyde Green, $C_{27}H_{27}N_3S_2O$, made by the action of ordinary aldehyde on an acid solution of rosaniline sulphate and the subsequent addition of sodium hyposulphite.

Aniline Orange. This name is applied to various compounds made by the action of amidosulphonic acids on phenols. The name is often applied to the so-called Victoria Orange, $C_7H_6N_2O_5$.

Aniline Red. See Fuchsin below.

Aniline Scarlet, $C_{18}H_{15}N_2O_4SNa$, made by the action of diazoxylene on naphthosulphonic acid.

Aniline Violet. See Mauveïn below.

Aniline Yellow (hydrochloride), $C_{12}H_{12}N_3Cl$, made by the action of nitrous acid on an excess of aniline.

Auramin (hydrochloride), $C_{17}H_{24}N_3OCl$, made by the successive action of phosgene gas (carbon oxychloride) and ammonia upon dimethylaniline.

Aurantia (ammonium salt of hexanitrodiphenylamine), $C_{12}H_8N_7O_{12}.NH_4$, made by the action of nitric acid on methyldiphenylamine.

Aurin, $C_{19}H_{14}O_3$, made by the action of oxalic and sulphuric acids on phenol.

Benzaldehyde Green. See Malachite Green below.

Benzidine Red. See Congo Red below.

Benzopurpurins, dyes of various scarlet shades. They are chemically allied to Congo Red (which see below) and are made by treating salts of toluidine (which is made from nitrotoluene, and is analogous to benzidine) with nitrous acid, and combining the resulting salts with α- and β-naphthylamine sulphonic acids.

Bismarck Brown. See Aniline Brown above.

Blackley Blue. See Indulin below.

Bordeaux. See Ponceaux below.

Chrysoidin (hydrochloride), $C_{12}H_{13}N_4Cl$, made by the action of diazobenzene chloride on metaphenylene diamine in aqueous solution.

Congo Red, or Benzidine Red, $C_{32}H_{22}N_6S_2O_6Na_2$, made by the action of nitrous acid and then of sodium naphthionate on benzidine hydrochloride.

Eosin, $C_{20}H_6O_5Br_4K_2$, or $C_{20}H_6O_5Br_4Na_2$, made by the action of bromine on fluoresceïn.

Erythrosin, $C_{20}H_6O_5I_4Na_2$, made by the action of iodine on fluorescein.

Fluorescein, $C_{20}H_{12}O_5$, made by the action of phthalic acid anhydride on resorcin.

Fuchsin, Rosaniline Hydrochloride, Magenta, or Aniline Red, $C_{20}H_{20}N_3Cl$, made by the oxidation of toluidine and aniline in the presence of acids.

Gallein. See Alizarin above.

Helianthin. See Methyl Orange below.

Indigo. See text of the article above.

Indulin, or Blackley Blue, $C_{18}H_{15}N_3$, made by heating aniline salts with amidoazobenzene.

Magenta. See Fuchsin above.

Malachite Green, Benzaldehyde Green, or Victoria Green, $3C_{23}H_{25}N_2Cl.2ZnCl_2 + H_2O$, made by the condensation of benzaldehyde with dimethylaniline, and the subsequent addition of hydrochloric acid and zinc chloride.

Martius' Yellow, $C_{10}H_5N_2O_5SNa$, made by the action of nitric acid on α-naphthol-monosulphonic acid.

Mauvein (hydrochloride), or Aniline Violet, $C_{27}H_{25}N_4Cl$, made by the action of chromic acid on aniline containing some toluidine.

Methyl Orange, $C_{13}H_{12}N_3SO_3Na$, made by the successive action of nitrous acid and methylaniline upon paraämidobenzene-sulphonic acid; it is the sodium salt of helianthin.

Methyl Violet, $C_{24}H_{28}N_3Cl$, made by oxidizing dimethylaniline with metallic salts.

Methylene Blue, $C_{16}H_{18}N_3SCl$, made by heating amidodimethylaniline with sulphide of iron.

Naphthol Yellow, $C_{10}H_5N_2O_8SK$, made by the action of nitric acid on α-naphthol-trisulphonic acid.

Night Blue, $C_{35}H_{34}N_3O$ (the hydrochloride of this is the commercial dye), made by heating pararosaniline with aniline and benzoic acid.

Nigrosin, $C_{18}H_{15}N_3$, made by heating aniline salts with nitrobenzene.

Pararosaniline (chloride), $C_{19}H_{18}N_3Cl$, made by oxidizing a mixture of paratoluidine and aniline with arsenic acid, or nitrobenzene.

Phenylene Brown. See Aniline Brown above.

Ponceaux, or Bordeaux. Various derivatives of azonaphthalene. "Ponceau 3R," $C_{19}H_{16}N_2O_7S_2Na_2$, is made by combining diazocumene chloride with β-naphthol-disulphonic acid.

Primulin, $C_{14}H_{12}N_2S$ (?), made by the action of sulphuric acid on thiotoluidine.

Resorcin Yellow, or Tropæolin, O, $C_{12}H_{16}N_2O_5S$, made by the action of diazobenzene-sulphonic acid on resorcin.

Rhodamine (hydrochloride), $C_{28}H_{31}N_2O_3Cl$, made by the action of phosphorous trichloride on fluorescein, and treatment of the product with diethylamine.

Roccellin, $C_{20}H_{13}N_2O_4SNa$, made by the action of β-naphthol on the diazo compound of naphthionic acid.

Rosaniline. See Fuchsin above.

Rose Bengale, $C_{20}H_4Cl_2I_2O_5K_2$, made by the successive action of chlorine and iodine upon fluoresceïn.

Rosolic Acid, $C_{20}H_{16}O_3$, closely allied to aurin; neither aurin nor rosolic acid is specially valuable.

Safranin, $C_{21}H_{21}N_4Cl$, made by the oxidation of a mixture of toluylene-diamine and aniline or toluidine.

Tropæolin. This name is applied to various compounds made by the successive action of nitrous acid and phenols upon amidobenzene sulphonic acids. See Resorcin Yellow above.

Uranin, $C_{20}H_{10}O_5Na_2$, the sodium salt of fluorescein (which see above).

Victoria Green. See Malachite Green above.

Victoria Orange. See Aniline Orange above.

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COAL'VILLE. A town of Leicestershire, England, 16 miles northwest of Leicester, in the midst of a coal district. It has mines, foundries, car works, and brick kilns. Pop., 1901, 15,281; 1911, 18,548.

COALVILLE. A city and the county seat of Summit Co., Utah, 40 miles southeast of Ogden, on the Union Pacific Railroad, and on Weber River (Map: Utah, C 2). It is in a coal-mining region and has stock-raising and agricultural interests. The water works and electric light plant are owned by the city. Pop., 1890, 1166; 1900, 808; 1910, 976.

COAMO. A town of Porto Rico, on the Coamo River, 18 miles east-northeast of Ponce, in a municipality of the same name (Map: Porto Rico, D 3). It is a favorite resort on account of mineral waters known as the Baños de Coamo. Pop., 1899, 3244; 1910, 3869. Pop. of municipality, 1899, 8249; 1910, 11,170.

COAN, kō'an, TITUS (1801–82). An American missionary, born in Killingsworth, Conn. He was ordained as a Congregational minister in 1833 and in that year explored Patagonia, where his attempt to establish a mission was unsuccessful. Immediately afterward (1835) he went to the Hawaiian Islands, and for the remainder of his life, except a visit to the United States in 1870, was a missionary at Hilo, where he received more than 12,000 into a church and organized missions from Hawaii to the Marquesas and Gilbert Islands. He published many valuable papers on the volcanoes of Hawaii and two books entitled *Adventures in Patagonia* (1880) and *Life in Hawaii* (1881), the latter a classic of missionary literature. See the *Memorial* (Chicago, 1885) by his wife.

COAN, TITUS MUNSON (1836–). An

American author, son of Titus Coan, born at Hilo, Hawaiian Islands. He was educated at Williams College and at the College of Physicians and Surgeons of Columbia University. From 1861 to 1863 he served as an interne at Bellevue Hospital and in army hospitals and from 1863 to 1865 was assistant surgeon in Admiral Farragut's squadron. In 1880 he founded, and thereafter was director of, the New York Bureau of Revision, and founded *Topics of the Time*. His writings include: *Ounces of Prevention* (1885); *Hawaiian Ethnography* (1899); *The Natives of Hawaii: A Study of Polynesian Charm* (1901); *Climate of Hawaii* (1901).

COAN GARMENTS. See Cos.

COANZA, kō-ăn'zȧ. See KUANZA.

COASTAL PLAIN. In physiography, the name given to a portion of the North American continent bordering the Atlantic Ocean and the Gulf of Mexico. From New York to Georgia the Coastal Plain includes the strip of low-lying lands that is limited on the east by the Atlantic and on the west by the first foothills of the Appalachian Mountain system. In northern Alabama the Coastal Plain passes around the southern limit of the Appalachians, after which it widens out and reaches northward as far as the Ohio River. West of the Mississippi River it extends with decreasing width southwestward into Mexico. The peculiar features of the Coastal Plain are its low elevation and the predominance of stratified rock formations of recent geological age. On the outer border the surface is flat and raised but little above sea level; towards the interior there is an increasing diversity of relief owing to the higher elevation and the extensive erosion by streams. The western limit of the plain, where the horizontal strata give way to the upturned and eroded rocks of the Appalachians, is marked by a sharp slope and by numerous cataracts. Geologically the Coastal Plain consists of Cretaceous, Tertiary, and Quaternary beds, which still retain the relative positions they acquired during deposition, although they have since been elevated above sea level. Consult Mill, *The International Geography* (New York, 1900). See AMERICA; UNITED STATES.

COAST AND GE'ODET'IC SUR'VEY, UNITED STATES. A bureau of the Department of Commerce, which has for its object the survey of the coasts of the United States and all coasts under the jurisdiction thereof, and the publication of charts covering those coasts. This includes the investigation of the character of the sea bottom, the location of reefs, shoals, etc., the rise and fall of tides, the direction and strength of currents, the character and amount of magnetic disturbances, and the position and elevation of points in the interior, for the benefit of commerce. An Act of Congress, approved Feb. 10, 1807, authorized a survey of the coast of the United States and appropriated $50,000 to pay for beginning the work. On March 25, 1807, a circular letter from the Secretary of the Treasury requested plans for the execution of the work. Nothing was immediately done beyond the consideration of these plans, and no further action was taken until April 16, 1811, when it was decided to send F. R. Hassler, whose plans had been approved by President Jefferson, to Europe to procure the necessary instruments. Mr. Hassler's proposed plan, briefly stated, was to determine the positions of certain prominent points of the coast by astronomical observations and to connect these points by trigonometrical lines from which to make a geodetic survey. Mr. Hassler sailed for Europe on Aug. 29, 1811, and, owing largely to the war between England and the United States which intervened, he spent four years in England and on the Continent, returning to the United States with his outfit complete on Oct. 16, 1815. Field work was actually begun on Aug. 6, 1816, under the direction of Mr. Hassler as superintendent. From this time until April 14, 1818, operations were continued in the vicinity of New York City. A base line was measured in the valley of English Creek, May 7, 1817, and one of verification, twice measured, was completed on December 6 of the same year. The triangulation connecting these measured lines represents the nucleus of the work of the Coast Survey and embodies its first tangible results. The trigonometric network now covers a large part of the continental portion of the United States, and will ultimately be extended north and south by Canada and Mexico. By agreement a common reference datum for all geographical positions in these countries has been adopted and designated "The North American Datum." On April 14, 1818, it was enacted by Congress that so much of the law relating to the survey of the coast as authorized the employment of other persons than those belonging to the army and navy be repealed. Between 1818 and 1832 little work was done. The instruments, records, and funds were transferred to the War Department, and the Coast Survey may therefore be considered as in army service during this period.

In 1823, 1824, and 1825 efforts were made by the Navy Department to establish a hydrographic corps, but public sentiment favored a return to the ideas of Jefferson. Bills were introduced in Congress in 1828 and in 1831, and one was finally passed, on July 10, 1832, carrying into effect the original law of 1807. On August 9 of the same year Mr. Hassler was again appointed superintendent. Field work was resumed in April, 1833. Less than a year later, March 12, 1834, the administration of the Survey was transferred from the Treasury Department to the Navy Department, Mr. Hassler, however, remaining in charge. These conditions held for two years, when a transfer was effected on March 26, 1836, and the Treasury Department again assumed control. Operations continued without interruption until March 30, 1843, when a Board of Reorganization was convened with Mr. Hassler as chairman. The plan submitted by this board practically continued in force the plans which had been formulated and acted upon in former years by Mr. Hassler. The scientific organization of the Survey may be properly said to date from 1832. Mr. Hassler died in 1843, having held the office of superintendent twice, from Aug. 3, 1816, to April 14, 1818, and from Aug. 9, 1832, to Nov. 20, 1843. During his incumbency of office the original triangulation in the vicinity of New York City was extended eastward to Point Judith, R. I., and southward to Cape Henlopen, Del. The area included in this triangulation amounted to 9000 square miles and determined the positions of about 1200 stations to be used in the delineation of about 1600 miles of shore line. Prof. A. D. Bache became superintendent in 1843. He extended the triangulation along the South Atlantic coast and among the Florida

Keys, instituted regular and systematic observations of the tides and the Gulf Stream, and investigated magnetic forces and directions.

The Civil War practically stopped the Survey, although many of its officers were assigned to service on Federal war vessels, where their knowledge of the coast waters proved of great service in the various naval operations which were conducted by the Northern fleets. In 1867 Professor Bache died and was succeeded by Prof. Benjamin Peirce, of Harvard University, who served until Feb. 17, 1874. Since then the successive heads of the Survey have been: Carlile P. Patterson, who served until his death in 1881; Prof. Julius E. Hilgard, who resigned in 1885; Frank M. Thorn, who resigned in 1889; Prof. T. C. Mendenhall, who resigned in 1894 to become president of Worcester Polytechnic Institute; Gen. W. W. Duffield, who resigned in 1897; Prof. Henry S. Pritchett, who resigned in 1900 to become president of Massachusetts Institute of Technology, and O. H. Tittmann, who was appointed superintendent in 1900.

The original and the principal purpose of the organization is a survey of the coasts of the United States primarily for the benefit of commerce. It is charged with the duty of publishing all results of such a survey that may be useful to the public. There has been added to its original duty, by legislation, that of determining the magnetic elements, exact elevations, and geographic positions in the interior. In 1878 the name of the organization was changed by Congress from Coast Survey to Coast and Geodetic Survey, in recognition of the extension of its functions to include triangulations in the interior.

The Coast and Geodetic Survey is a bureau of the Department of Commerce, and the head of the bureau, known as the superintendent, reports to the Secretary of the Department. The superintendent is charged with full responsibility in every respect for all the work of the bureau. He is aided in such of his duties as cannot be delegated to officers of lower rank by an assistant superintendent, who acts as superintendent in his absence. Eight officers or groups of officers report directly to the superintendent and assistant superintendent, viz., (1) the assistant in charge of the office; (2) the inspector of hydrography and topography; (3) the inspector of geodetic work; (4) the inspector of magnetic work; (5) the disbursing officer; (6) the editor; (7) the chiefs of field parties; (8) the heads of suboffices. The first four of these officers have a general supervision over all the operations of the Survey both in the field and office, each acting as an advisory officer to the superintendent in regard to specified portions of the work. The functions of the fifth and sixth officers are stated fully further on. The officers in groups seven and eight have direct charge of all operations in the field. Each field party is a temporary organization which is created for a specific operation by an order of the superintendent, which makes one of the officers of the field force the chief of party, and, if necessary, assigns to him as subordinates one or more other officers from the same force. The party is disbanded when the work assigned to it has been completed. If the party is for duty on land the remainder of the organization of the party, the hiring of laborers, drivers, etc., is left to the chief of party. If the party is for duty on a vessel, the assignment of an officer of the field force to command the vessel carries with it, necessarily, the command of the whole force on board the vessel, including watch and deck officers as well as crew. There was in 1913 a field force of 64 assistants, 29 aids, 12 magnetic observers, 4 nautical experts, 12 tide observers, 55 watch officers, engineers, surgeons, deck officers, etc., and 343 enlisted men, together with others found necessary to secure effective work, while the office force, consisting of 165, is divided as follows: disbursing agent, chiefs of division, clerks, computers, draftsmen, engravers, instrument makers, printers, etc. Field officers are subject to office duty. The Survey has a fleet of 10 steamers, 1 schooner, and small craft. There are suboffices at San Francisco, Cal., and Manila, P. I. The survey of the Philippine Islands has been undertaken in coöperation with the insular government, which furnished four steamers for the work and pays a large portion of the expense, and in 1914 was rapidly nearing completion. About 63 per cent of the coast line of the islands had been surveyed in the interval between 1900 and 1914.

The inspector of hydrography and topography, reporting directly to the superintendent, has a general supervision over the classes of field work indicated in his title, places before the superintendent plans for such work, makes the necessary inspection in the field to insure that the superintendent's orders are carried out economically and effectively, and is especially charged with the supervision of all matters relating to the ships and their *personnel*. *The Coast Pilot*, a publication giving full description of the coast from the mariner's point of view, sailing directions, warnings as to dangers to navigation, and other information of special value to navigators, is prepared under his direction. The inspector of geodetic work, reporting to the superintendent, is charged with the duty of preparing plans for the field operations of triangulation, astronomic determinations, and precise leveling, and of making inspections of parties in the field, and of records and correspondence received at the office from field parties, with a view of insuring that the field operations are in accordance with the superintendent's orders, are of the desired degree of accuracy, and are efficient and economical.

The inspector of magnetic work, reporting to the superintendent, is charged with similar duties in regard to the magnetic work of the Survey. The assistant in charge of the office, reporting to the superintendent, has charge of the office at Washington, is responsible for the safety and arrangement of archives and property, and receives all money paid to the Survey for charts and other publications. As the official head of the office, the chiefs of the following divisions of the office force report to him: computing division, magnetic division, tidal division, drawing and engraving division, chart division, library and archives division, and instrument division. Each of these divisions, under the direction of the assistant in charge of the office, prepares replies for the superintendent's signature to such parts of the correspondence as fall within its particular field and also furnishes such information and equipment to field parties as it is within their power to furnish. In the computing division all computations in connection with triangulation, astronomic determinations, and precise leveling are made, appropriate regis-

ters of results are kept, and the results prepared for publication as rapidly as possible. The magnetic division and the tidal division deal similarly with the computations and publication of magnetic and tidal results, respectively.

The chart-construction division is divided into five sections: (1) the photographing section, engaged in reducing, enlarging, and reproducing drawings for various purposes; (2) the drawing section, engaged in making from the original topographic and hydrographic field sheets, the office drawings, which are the originals in completing unfinished hydrographic sheets sent in from the field, corrections of charts especially with reference to aid to navigation (lights, buoys, etc.), preparation of data for the weekly *Notices to Mariners* published by the Bureau of Lighthouses in coöperation with the Survey, and the inspection of charts in their various stages of preparation, from which charts are produced, either by engraving on copper or by photolithography; (3) the engraving section, engaged in copperplate engraving; (4) the electrotype section, engaged in producing, from the original engraved copperplates by electrotype process, the copper plates actually used in printing the charts; (5) the printing section, engaged in printing charts from the copperplates and by photolithography. The chart division is engaged in applying such hand corrections to charts, before issuing, as have become necessary on account of changes, principally in the aids to navigation, as have taken place after the chart was printed; and with the clerical work connected with the issue and sale of charts, coast pilots, and tide tables. The library and archives division has charge of the library of the Survey and the archives in which all hydrographic and topographic sheets and all the original records and computations are stored.

The instrument division has charge of all the instruments and general property. Instruments needed for work of primary importance are designed and made in the division, and it is continually engaged in the repairing and remodeling necessary to keep the instrumental outfit at a high standard of efficiency. The accounting division, at the head of which is the disbursing officer, is not a division of the office in the sense of reporting to the assistant in charge of the office. This disbursing officer makes all disbursements on account of the Survey, with the approval of the superintendent, renders a quarterly account of all such disbursements to the auditor for the State and other departments, renders a statement of expenditures and balances to the superintendent whenever required to do so, suspends returns for correction or disallows all items of expenditure irregular in form or in contravention of law or regulations, and refers to the Comptroller of the Treasury, for decision, all apparently excessive or unnecessary charges. The editor, reporting to the superintendent, compiles the administrative part of the annual report and acts as editor in connection with all other publications of the Survey except the charts.

COAST ARTILLERY. This term means both the guns used in harbor defense and the troops that man these guns. In most countries there is no special body of men exclusively assigned to harbor defense. That duty is taken to fall naturally to the foot, or unmounted, artillery. In the United States, however, the Coast Artillery constitutes a special corps. (See COAST ARTILLERY CORPS.) If we keep in mind the great length of our coast line, and the fact that some of our most important harbors are immediately on that line itself, it is logical to assign their defense to a special body of men. In England the duties of harbor defense fall to the Royal Garrison Artillery, one of the great subdivisions of the Royal Regiment of Artillery.

For general administrative purposes the coast of the United States is divided into three districts: the North Atlantic, from Maine to Delaware; the South Atlantic, from Delaware to Texas; and the Pacific, from Washington to the southern boundary of California. Two of these are under the command of general officers coming from the corps. The general districts are themselves further subdivided into artillery districts proper, commanded by colonels and lieutenant colonels. Of these artillery districts proper, there are 9 in the North Atlantic, 12 in the South Atlantic (including the Gulf States), and 4 in the Pacific Coast district, respectively. To these must be added 2 districts in the Philippines, Manila Bay and Subic Bay, and 1 in the Hawaiian Islands.

The following table exhibits the guns served by the Coast Artillery (only calibres greater than 3 inches are included); the powder used is a nitrocellulose.

GUN	Weight of projectile	Range, yards corresponding to maximum elevation
3-inch	15 uncapped	8,500
4 "	33 "	8,500
4.72	45 "	11,000
5	58–59 long cap	10,000
6 (1908)	108 " "	11,000
8, M I and M II	323 " "	11,000
10	617 " "	12,000
12 (Mod 1900)	1070 " "	11,000
14 (1910)	1660 " "	18,000
16	2400 " "	18,000
12-inch mortar (1912)	700 " "	20,000

A strong family likeness exists among all guns used for harbor defense; all fall substantially under three classes, (*a*) high power, of large calibre, 8 inches and upward, for the attack of side and turret armor; (*b*) high power, of smaller calibre, 3 to 6 inches, for unarmored vessels, torpedo boats, and to sweep mine fields: (*c*) mortars for deck attack, of which the chief development is to be found in the United States. The English place their principal reliance on a 9.2 piece for ship attack. In other countries, until lately, the highest calibre was 12 inches, but there is to-day a distinct tendency to go beyond this limit. For details, see ORDNANCE.

COAST ARTILLERY CORPS, kōr. That portion of the army of the United States charged, by the Act of Congress approved Jan. 25, 1907, with the care and use of the fixed and movable elements of land and coast fortifications, including the submarine and torpedo defense. Its *personnel* consists of a chief with the rank of brigadier general, 14 colonels, 14 lieutenant colonels, 42 majors, 210 captains, 210 first lieutenants, 210 second lieutenants, 48 "additional" officers, 63 sergeants major, 26 master electricians, 74 electrician serjeants, 1st class, 74 electrician serjeants, 2d class, 42 master gunners, 60 engineers, 60 firemen, 170 companies, and 14 bands—a total of 749 officers and not exceeding 18,931 enlisted men. Officers and certain classes of noncommissioned officers and men receive their

technical instruction at the Coast Artillery School at Fort Monroe, Va. The regimental organization of the United States artillery was abolished by the Law of Feb. 2, 1901, and the entire arm was designated as the "Artillery Corps," which was charged with the care and use of both field and coast artillery. By the Act of Jan. 25, 1907, these two branches were made separate and distinct, 6 regiments of field artillery were created, and the "Coast Artillery Corps" was organized as outlined above. See ARMY ORGANIZATION; COAST ARTILLERY; COAST DEFENSE; UNITED STATES, *Army*.

COAST DEFENSE. A sharp distinction should be drawn between coast defense and coast defenses. Coast defense involves the protection of the coast at all points, whether fortified or not, against any enemy whatever. It thus involves all arms of the service, even cavalry, for it is conceivable that the enemy, wishing to possess himself of New York, e.g., and deterred by the difficulties of a purely naval attack, may endeavor to land an army at some unprotected point and attack the city in the rear. Or a fleet may attack any unfortified region of the coast in order to support the operations of an army already ashore. To guard against such a possibility is a function of coast defense, even though not a single shore gun had fired a shot. Coast defenses, on the other hand, are the various works and batteries with all their auxiliaries, prepared in time of peace for the defense of the principal ports and waterways against purely naval attack. But even in such an attack land troops, chiefly infantry, as distinguished from artillery troops proper, may be called to play a part and should always be available.

In any war carried on over sea by a strong naval power, the acquisition of a hostile port is a matter of prime importance. Hence works are erected the world over in order to make such an acquisition, if not impossible, at least extremely difficult. In the modern defense of harbors two great classes of elements are employed: (1) guns or mortars for the direct attack of ships; (2) obstructions to delay the advance of a fleet. These obstructions themselves are either (*a*) passive, such as booms, sunken barges, etc., or (*b*) active, i.e., submarine mines, and dirigible torpedos operated from the shore. The chief reliance to-day, however, rests on submarine mines. To these two great classes of elements must be added warships proper, if any should be available. A moment's reflection will show the relation existing between the two classes of elements just mentioned. Without obstructions a fleet may run past the works, e.g., by night, or in thick weather, or even in broad daylight. Without guns and mortars the removal of obstructions is merely a question of time, involving practically no risk. But by the combination of these two elements a fleet is stopped under the effective range of the shore guns, since obstructions are placed where they can be easily swept by the batteries.

Whether coast defense in its narrower sense of harbor defense should be intrusted to the army or to the navy has been a much-debated question. The solutions reached vary according to the necessities of the countries interested. To-day, in the United States and in England, harbor defense is left to the army; in Germany, chiefly to the navy. It should be recollected, however, that Germany has only two ports—military ports—whose defense gives her any particular concern. The French have apparently never been able to come to any rational decision of the matter: the army and the navy are both responsible, so that in case of war confusion and inefficiency would probably result. It is clear that where harbor defense is intrusted to the army, the navy is free to discharge its principal function, viz., to seek out and destroy the enemy's fleets. This principle may safely be ignored only when, as in the case of Germany, harbor defense is relatively unimportant. It should be recollected, further, that even if the navy should be charged with the defense in question, it must employ the same means as the army, when it is responsible.

The defense of a seacoast involves the principles of both strategy and tactics. In considering the principles of strategy applicable to coast fortification it is essential to take into account the navy as our first line of defense. Every nation possessing a coast line has commercial interests, the protection of which requires a navy. Her fleet, whatever its strength, will require points of support on the home coast, to serve as a basis of operation in attack or defense. These points of support contain all the material necessary for building or equipping ships; they furnish all the needed men and supplies to the navy and must offer for a beaten fleet, or one which on the outbreak of war has not yet completed its equipment, a safe harbor to repair damages or complete equipment. Naval material is very expensive; it is difficult or impossible to secure it after war has begun; consequently, the greater part must be prepared in time of peace and collected at the points of support, for which purpose extensive depots, magazines, and other constructions must be erected. To prevent their destruction at one blow and to guard the fleet, while still taking in supplies or completing its equipment, against surprise, these points of support must be protected by suitable means, and this is the purpose of fortifications.

The only points of a coast that fulfill the conditions imposed by these considerations are the larger harbors (always bays and mouths of rivers), and they must be fortified not only against attack by sea, but also against land attack, for the war between Japan and Russia showed conclusively that important naval ports (Port Arthur, e.g.) may be taken by forces landed on the coast without risking an attack on them by sea.

In applying the principles of land tactics to the selection of sites for, and the construction of, seacoast forts, some modifications must be introduced, due to the fact that the enemy in the latter case is confined to the navigable channels, so that all his possible flanking attempts can be foreseen and provided against. The principles of tactics which find application here are: 1. To obstruct the enemy's advance, while leaving free that of the forces of the defense for offensive movements; in other words, so to obstruct the water approaches against the enemy as to leave free entrance and exit for the defending fleet. 2. To be superior to the enemy at the point of attack, i.e., to bring to bear on the channels of approach a heavier fire of high-power guns and howitzers and mortars than any fleet able to operate there can bring to bear on the defenses. 3. To place the isolated units for most effective action so as to be mutually

COAST DEFENSE GUNS—U. S. ARMY



1. TWELVE-INCH GUN MOUNTED ON BARBETTE CARRIAGE, WITH FIRING DETAIL. Weight of Gun, 52 tons. Weight of Projectile, 1046 pounds. Weight of Powder Charge, 279 pounds. Projectile carries bursting charge of 58½ pounds

2. THREE-INCH FIFTEEN POUNDER RAPID FIRE GUN ON BARBETTE CARRIAGE

supporting; this is accomplished by scattering the forts to prevent the enemy from concentrating his fire, at the same time arranging them so that fire can be concentrated on him. 4. To protect well the flanks of the position and compel the enemy, if he attacks at all, to make a direct frontal attack. This is done by closing all unnecessary channels, by protecting the obstructions by means of rapid-firing guns and the operators by means of bombproofs, and at night by illuminating the obstructed field with search lights. 5. To provide means for offensive returns against countermining operations, either by means of a swarm of torpedo boats, or by batteries for operating movable torpedoes from the shore. To these must be added an accurate and rapid range-finding and communication service.

There are two systems of guns in use in coast artillery: the flat trajectory, high-power guns, designed to pierce the side armor of battleships, and the high-angle pieces (howitzers or mortars) whose projectiles are designed to fall on the decks. Both are necessary, and each has its proper sphere of action, the former having by far the greater accuracy, and the latter attacking the battleship at its weakest point. In Europe howitzers are generally preferred; but the recent development of mortar fire in the United States service has proved the greater value of the latter. The calibre of the fort guns must be at least equal to that which the depth of water in the channel will enable the enemy to bring against the defenses and sufficient to pierce his armor at the outer mine field. The greatest thickness of Krupp armor used in the latest battleships is about 15 inches at the belt, and to penetrate this at the required range will require a 12-inch gun. The average thickness of deck armor at present is about 3 inches of hardened nickel steel, and to penetrate this a high-angle gun (howitzer or mortar) 12 inches in calibre will be required. These are the maximum calibres required against battleships, but to prevent distant bombardment of cities, etc., there are larger rifles and for close ranges also an 8-inch rifle. Armored cruisers have from 5 to 6 inches of hardened nickel-steel armor, and to penetrate their armor within the mine field (where they first come seriously into play) will require a 5-inch or 6-inch rapid-fire gun. The smaller vessels have but little armor protection, but as they come into action at the outer mine field (about 3600 yards) the smaller calibre guns to fight them must have the necessary penetration at that range, consequently must be about 2.5 to 3 inches in calibre.

The number of guns of each calibre essential to the defense of a harbor depends primarily on its importance; a weighty factor of this importance is the depth of water approach.

From the depth and length of the approach, taken in connection with the importance of the place, political or commercial, can be determined the number and nature of ships that might attack, and hence roughly, the number of guns to be provided by the defense. These should be, preferably, as many as the enemy can bring to bear, never less than half as many. If the enemy's armament is not known, then in deep channels from 30 to 60 guns of 6-inch calibre and over must be allowed to the mile. (Abbott.) The outer mine line is derived by the intersection of the curves representing the limit of armor-piercing ranges of the guns on either side of the entrance, so that these torpedoes are under the effective fire of all the guns in the harbor; the inner line is usually at the narrowest part of the entrance.

The battle tactics of coast defense comprise defense against blockade, bombardment, and attack by sea.

DEFENSE AGAINST BLOCKADE

The object of a blockade is the isolation of the port concerned in order to close all commercial communication by way of the sea, and presupposes the defeat of the enemy's fleet, which may also be shut up in the port. The observation of the movements of a daring enemy thus shut in is one of the most difficult problems which fleets have to encounter, and history shows that it is almost impossible. "For example, in 1759, the French fleet succeeded in breaking through the blockade of Dunkirk without being observed by the English fleet consisting of 66 ships." "In 1805 Nelson was in continuous observation of the harbor of Toulon. In spite of this fact the French fleet succeeded in running out, returning again because of injuries at sea, again leaving the harbor and joining the Spanish fleet, the combined fleets then sailing for the West Indies. Only after their return was Nelson enabled to seize them." The defender will naturally resist the blockade as long as possible and try to fit his fleet for active service again as promptly as he can. His first duty, then, is to keep the blockading fleet as far out as possible, and this duty will fall to the coast artillery, which must be constantly prepared, the guns ready for immediate action, the stations and range finders continually manned, and the searchlights constantly at work. The plentiful use of electric light as a fighting agent is a passive factor, but one of very high value. His next duty is to inflict as much damage as possible on the blockading fleet, and this duty falls to the fleet stationed in the harbor, which must at all times be ready for action, and single torpedo boats should be sent out, under cover of darkness, to attempt the destruction of the enemy's ships. When the defeated fleet is ready for sea again, the coast artillery will open a heavy fire on the enemy's ships, and, aided by their own artillery fire, the home fleet will endeavor to break through. This will naturally lead to a purely naval engagement, which need not be further considered here.

DEFENSE AGAINST BOMBARDMENT

Bombardments aim chiefly at the destruction of the naval establishments of a port, such as the arsenals, docks, magazines, and ships of the fleet lying in the harbor, but also secondarily at the destruction of cities and establishments other than those purely naval, in order to produce a moral effect on the people. Bombardments are applicable only under special circumstances and not against every harbor; indeed, the latter must be a true roadstead. But even then the fortifications and armament must be either weak or obsolete. From this fact, and because of the limited supply of ammunition carried by ships, a bombardment will but rarely be justified. If it is attempted, however, the attacking fleet will set aside a small portion of its artillery to attack the coast artillery, re-

serving the greater part to attack the establishments lying within the harbor.

The defender will attempt to hold the open sea as long as possible with his fleet, but when driven in he will assemble his ships in rear of the outer obstructions, or at least attempt to hold that line with his torpedo boats. The coast artillery will endeavor to keep the enemy as far as possible from the harbor. The object being to prevent, if possible, a bombardment of the harbor or city, all guns should take part, and when the enemy's fleet approaches the proper range, high-angle fire, with deck-piercing shell, will be used. The gunboats and coast defenders or monitors of the home fleet can materially assist the coast artillery by the fire of their guns, but they must be protected from the enemy's torpedo boats by a number of destroyers. As in case of blockade, the guns must be kept constantly manned and ready for action, and at night the searchlights must be constantly at work. Should the enemy be forced to retire, the home fleet must advance to the attack. See BOMBARDMENT.

DEFENSE AGAINST ATTACK BY SEA

In attacking a hostile coast a fleet may either direct its efforts against a fortified harbor or attempt to take possession of unfortified coast regions. The problem for the defense, therefore, naturally resolves itself into the defense of fortified places and the defense of unfortified coast regions. The phases of the attack by sea in the first case are, in order, the removal of the outer obstructions, the reconnaissance, the artillery duel, the removal of the inner obstructions, the forcing of the entrance, and, finally, landings to obtain full possession of the forts. The phases of the defense will correspond.

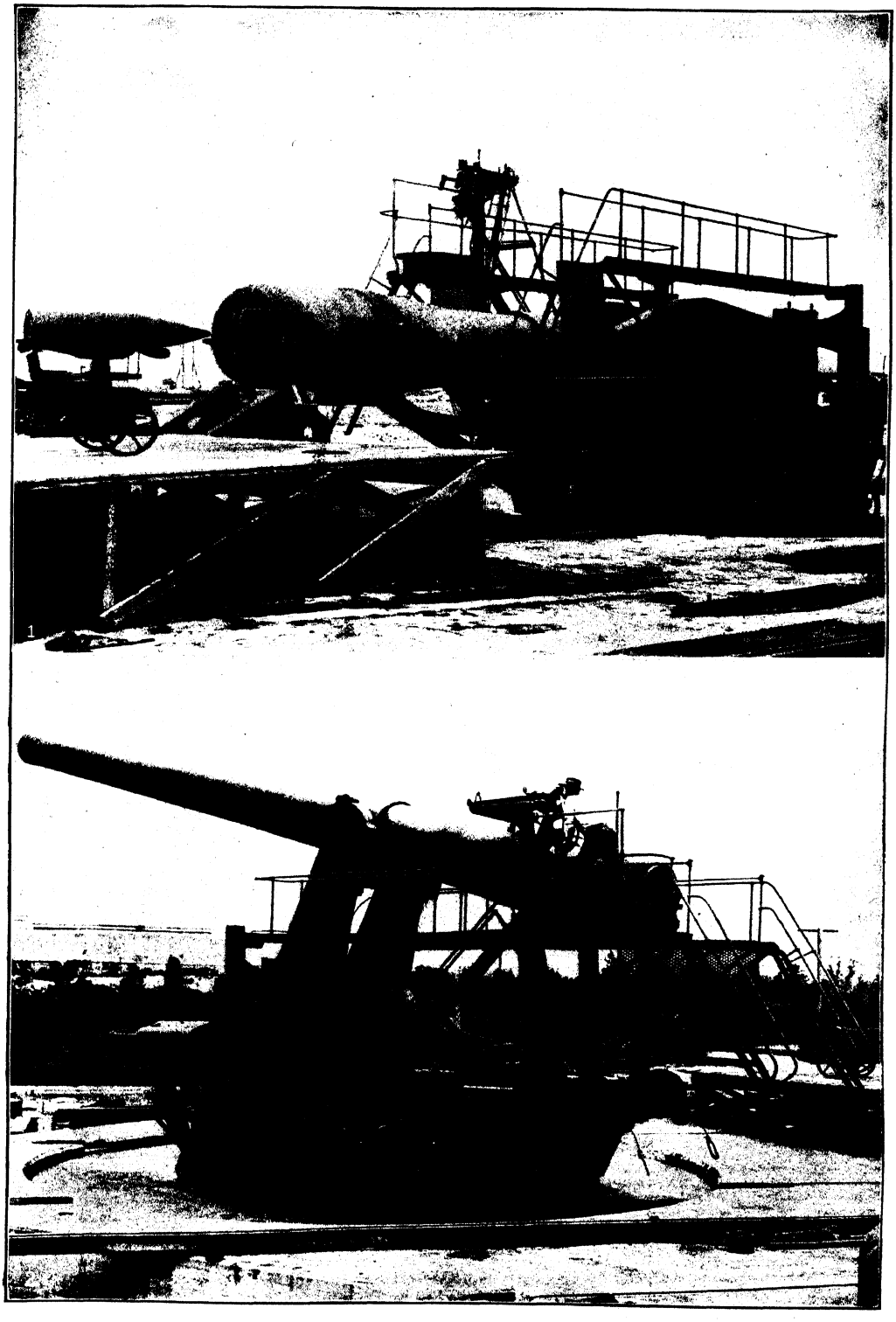
Before endeavoring to ascertain the position of the guns of the defender, the attacking fleet will seek to destroy outer obstructions, in order to get possession of the outer bay, and, if the opportunity should offer, to force the passage. The outer mine field is so important that there will be a serious struggle over it, for, once the attacking fleet passes over it, its further work is greatly simplified.

The defender, therefore, must be constantly on the alert, especially at night, when the searchlights are continually in use lighting up the foreground beyond the mines. All approaching ships are fired upon by the artillery, and since the enemy will probably not attempt to remove the mines with any but his smaller vessels, such as torpedo boats (since the outer mine field is placed intentionally in the field of the greatest effect of the guns on shore, both vertical and horizontal), rapid-fire guns should be used, because these small vessels move rapidly, offer but a small target, and their work, by the time their purpose is known on shore, can be done promptly. Moreover, since the attack may be directed on several points of the mine field at the same time, it is best to assign the rapid-fire batteries to particular sectors of the mine field to insure prompt action on all the enemy's vessels. The torpedo boats of the defense remain close up to the mine fields in order to fight the enemy's torpedo boats while they are endeavoring to remove the mines. The counterattacking torpedo flotilla must be followed by one or two mine-laying ships, for repairing the damaged mine lines.

The attacker's object in reconnaissance is to obtain full and accurate knowledge of the location and power of the defender's guns of all calibres and kinds, the position of the torpedo batteries and mine observation stations, and finally to find out what new gun positions have been erected for the war. The defense, therefore, endeavors to veil all his batteries that cannot be readily seen from the sea, and still further to deceive the enemy he erects a number of small batteries. Batteries with disappearing carriages and mortar batteries have here a great tactical advantage, because they can be readily concealed. While the fleet is reconnoitring, therefore, beyond the outer mines, only such guns of the defense open fire as cannot be concealed, but as the ships come near the mines and take up the formation in column, the other batteries open fire with armor-piercing projectiles. Each battery is assigned to a different ship, on which it concentrates its fire, and which it follows until it is sunk or gets beyond armor-piercing range. The coast artillery is assisted in this work by the guns of the ships that may be in the harbor, these vessels moving inside the mine field on lines perpendicular to the enemy's line of advance, making the greatest possible use of their artillery, the torpedo boats making counterattacks when possible. The infantry garrison of the fortified place is posted on outpost along the shore, and prevents the enemy from landing reconnoitring parties, or fires on torpedo boats sent along the shore to reconnoitre. In case the mine obstruction was removed by the enemy before his reconnaissance, the defender's larger vessels cannot take so advanced a position close up to the mine field, and as soon as the attacker approaches the latter the defender must bring all his guns into action.

The object of the artillery attack is to silence all coast forts and batteries commanding the harbor entrance, to put out of action all guns mounted in them, and to destroy all positions flanking the obstructions. It is the preparation for the final assault. The main strength of the defense in this phase of the action will be the coast artillery, and since the enemy, because of his limited supply of ammunition, will probably endeavor to gain the upper hand as rapidly as possible, this artillery will require an energetic, decisive, and rapid service, and should be assisted by the artillery fire of the ships of the defense that may be in the harbor. The targets to be attacked are mainly the large, heavy battleships, whose vitals are protected by powerful armor. To reach the vitals is the business of the heavy calibres, but a ship may be put out of action before its vitals are seriously affected. The coast-artillery defense proper must be thoroughly organized in advance, and hence the command of a fortified place is given to a fortress commander, under whom are the district commanders, and these again control the group of battery commanders and the searchlight stations. The heavier armor of a battleship is on her belt, extending above and below the water line, while the deck is but slightly protected. The large calibre, flat-trajectory guns are used for piercing the heavy side armor, and with the United States explosive D, and the delay-action fuse of the Ordnance Department, the destructive effect is expected to be enormous. Howitzer or mortar shells are used for piercing deck armor; rapid-fire guns for firing on unprotected parts and clearing decks and tops.

The naval battle of Santiago clearly illus-

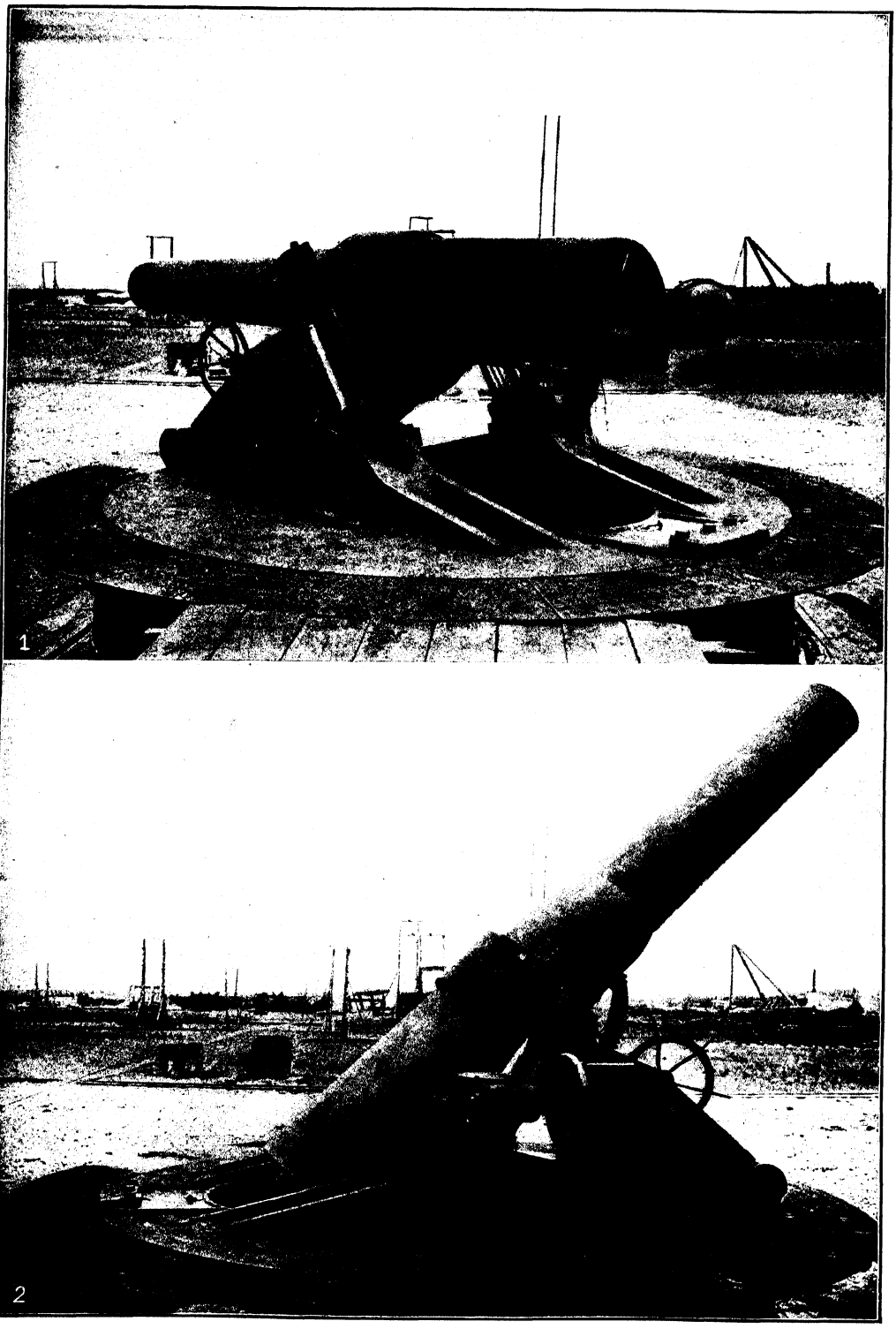


UNITED STATES ARMY 14-INCH GUN MOUNTED ON DISAPPEARING CARRIAGE

No. 1. LOADING POSITION. No. 2. FIRING POSITION.

Weight of gun, 51 tons. Weight of projectile, 1660 lbs. Weight of powder charge, 349 lbs. Range, 19.000 yards.

COAST DEFENSE MORTAR



U. S. ARMY 12-INCH MORTAR MOUNTED ON 1912 CARRIAGE

1. LOADING POSITION. Weight of Mortar, 15.1 tons. Weight of projectiles, 700, 824, and 1046 pounds. Weight of powder charge varies according to zone: maximum about 89 pounds. Projectiles carry bursting charges varying from 24.16 pounds to 98.4 pounds. Maximum range, 19 000 yards

trated the value of a good artillery, and if such a magnificent action is possible from aboard ship, a far more favorable effect is to be expected from the land. But this battle also shows how dangerous it is to neglect all preparations on the part of the coast artillery, and the Spanish coast artillery must bear a large portion of the blame for the sacrifice of Cervera's fleet. Special attention must be paid to the equipment of the observation stations of the district artillery commanders. Good telescopes and photographs and plans of the enemy's ships must be available for immediate use, in order to facilitate the ready recognition of hostile ships, and in the group and battery commanders' stations there must be more detailed plans of the ships to determine the projectiles to be used at various ranges. Works are now published giving, in silhouette, the appearance (to the naked eye, at a particular distance) of every important warship.

The inner obstructions consist of lines of mines, sea barricades, and occasionally also of a submarine dike. The decisive engagement for the possession of the harbor will be fought at this barrier, for which reason it is protected by numerous rapid-fire and torpedo batteries. The reconnaissance of the inner obstructions, and even their partial removal, may be attempted by the enemy during the artillery duel; hence the defender must make constant use of his searchlights to detect such a move. The assailant will first attempt to destroy the inner obstructions by means of torpedo boats, then he will try to break them up by artillery fire, and finally he may attempt to land detachments at night to blow them up, or send a drifting mine destroyer against them. The inner mines are usually within the effective armor-piercing range of the heavy guns, as well as under the fire of the rapid-fire batteries; the former act against the armored ships, the latter against the small and fast torpedo boats or unarmored vessels.

The forcing of the entrance is the closing act of the assailant's undertaking, and its object is the final occupation of the disputed harbor. At the head of the final assault are torpedo boats which, acting as a patrol, make a final attempt to break through the obstructions. These, as well as the torpedo flotilla following them, should be greeted with a hail of projectiles from the rapid-fire guns of the shore batteries. All other coast guns and howitzers should be directed against the battleships of the attacking fleet and should fire especially at the leading ship. As the attacking vessels enter the harbor, the fire of the coast guns is concentrated more and more against the vessels following. This artillery battle is continued until each fort in succession is taken by the enemy. The home fleet inclosed in the harbor should now attempt to break through the lines at all hazards, and this can best be done at night.

Military history proves that it is by no means easy to capture a well-defended harbor by the means at the disposal of a fleet. The success of Farragut in the Civil War appears to contradict this statement, but it must be remembered that the condition of the navy on the one hand, and that of the coast artillery on the other, were at that time more favorable for forcing a harbor than they are to-day. Nevertheless, on many occasions, Farragut himself, while attacking a seacoast, called for assistance from the artillery on the land side. Wars are so short nowadays, and decisive battles are sought so quickly in the interest of the countries concerned, that the cooperation of a strong land army is now deemed essential to support the naval attack; indeed, the land attack will generally be the principal one. This was shown to be the case in the Chino-Japanese War, the Spanish-American War, and especially in the Russo-Japanese War. The best protection of a seacoast is a powerful navy, but should the latter meet with misfortune the coast must be protected to prevent landings. The defense of the unfortified portions of the coast will be intrusted to a special coast-guard corps, strong enough to oppose the enemy at all points with superior forces. To determine what this strength should be, the landing of the Japanese for the purpose of attacking Wei-hai-wei furnishes some useful data. The army of 27,000 men was landed in 36 hours; consequently, with the better means available to-day, about 20,000 men can be landed in 24 hours, hence a coast-defense corps of equal strength should be able to appear at the landing place in that time, and, considering the necessary detachments to be left at various points, it will take about 30,000 men to guard the coast between two fortified forts not over a day's cruise apart.

It may be remarked, in conclusion, that the issue of future ship attacks on adequate coast defenses is highly problematical. The function of the modern warship is chiefly the attack of other ships; the attack of seacoast forts is secondary. In the next place, the fire of shore guns well handled is to-day so rapid and accurate that no fleet will expose itself to its effects save under emergency. Coast defenses will have answered their purpose as fully by dissuading a naval enemy from attacking as by repelling his attack if he should attempt it.

Consult: Abbot, *Defense of the Seacoast of the United States* (New York, 1888); Wisser, *Tactics of Coast Defense* (Kansas City, 1902); Clarke, *Fortification* (New York, 1907); and the works of Mielichhofer, of the Austrian artillery. For a description of the ordnance used in modern coast defense, see ORDNANCE, the historical side of the subject being treated under ARTILLERY. The article on FORTIFICATION discusses the history and construction of coast defenses, together with the scheme adopted for the defense of the coast of the United States, and should be read in this connection.

COAST DISTRICTS. See KÜSTENLAND.

COAST GUARD. The coast-guard service of Great Britain was originally established as a means of revenue protection, but was reorganized and transferred to the Admiralty in 1856. It now partakes of the character of a naval reserve, life-saving, and signal service in addition to its duties in connection with the customs. It is under the control of the admiral superintendent of naval reserves, who has a captain in the navy as his assistant. The coasts of the United Kingdom are divided into six districts—Eastern, Southern, Western, Scottish, North of Ireland, and South of Ireland—each presided over by the captain of the coast-guard station ship of the district, which vessels are usually old-type armorclads. In addition there were (in 1914) six cruisers of 278 to 805 tons, besides several tenders. The districts were subdivided into 44 divisions in charge of inspecting officers consisting at the date mentioned of 30 commanders, 37 lieutenants, and the remainder of subordinate

coast-guard officers. The divisions are divided into stations, each in charge of a chief officer who is about equal in rank to a warrant officer. The coast between stations is patrolled at all times, day and night, and means of signaling to vessels is kept ready for instant service. The regulations of entry vary from time to time, but the men are all good-conduct men who have completed a long term of service in the navy and are not above a certain age. According to the budget of 1913–14, the number of commissioned officers attached to the coast-guard service was 102, exclusive of officers regularly serving on board the vessels of the navy acting as station ships and gunboats. There were also 198 chief officers of stations and 2830 petty officers and seamen, making a total of 3130 persons. Many of the men composing the coast guard were old men-of-war's men who retired from active service on completion of their regular service. The pay is comparatively high, and in many cases free houses are provided.

In 1913 the Secretary of the Treasury of the United States proposed that the United States Life Saving Service and Revenue Cutter Service be consolidated for administrative purposes under the title of Coast Guard.

COASTING. An outdoor winter game, supposedly of Russian origin. The sport consists of sliding down a slippery bank or other inclined grade of snow or ice, by means of a sled, or two sleds attached by a board, the rear one rigidly, the front one on a pivot so that it may be moved for steering. These contrivances have various local names, such as "bobsled," "double-ripper" and "double-runner." The connecting board may be long enough to seat from 8 to 12 coasters. Consult Steele, "Coasting," in *Outing Magazine*, vol. xli (New York, 1903). See TOBOGGANING.

COASTING TRADE. The commerce carried on by sea between the different ports of the same country. In Great Britain "coastwise" is defined to mean "from any one part of the United Kingdom to any other part thereof." Vessels engaged in this commerce are subject to different rates and regulations from oversea traders, and the masters must keep their books showing that their cargoes come strictly within the definition of coasting trade. Formerly no goods or passengers were allowed to be carried from one port of the United Kingdom to another except in British vessels; but this restriction was repealed in 1854, and the coasting trade in Great Britain is now open to all the world, though the share of foreign nations is inconsiderable. Most other countries, however, reserve the coasting trade to their nationals, as does the United States, which restricts the trade to ships built and owned in the United States, as well as officered and chiefly manned by Americans. The term "coasting trade" usually includes also the trade between the mother country and its colonies. This interpretation of the term is followed by the United States.

Owing to the length of coast, this trade in the United States is far more extensive than in any other country. Of the 49 States and Territories (exclusive of Alaska), 18 border on the Atlantic Ocean and the Gulf of Mexico, and three border on the Pacific Ocean, to which may be added the enormous coast line of Alaska, Hawaii, and Porto Rico. The extensive commerce of the Great Lakes is also included in the coasting trade. In the time of the early settlements such trading was done in small shallops, sloops, and schooners, and there was very little of it. With the growth of the country in population the trade has grown until the tonnage engaged in it exceeds by 40 per cent the total tonnage of the German Empire. At the present time many hundreds of steamers and many more hundreds of sailing craft are constantly plying from Maine to Texas, transferring the cotton, sugar, rice, and lumber of the South to Northern, and the grain and manufactured goods of the North to Southern markets. In summer these coasting steamers do a large share of the passenger as well as trade traffic. The thoroughness of the coast survey, and the introduction of the weather service, whereby mariners are duly forewarned of danger, have done much to prevent the disasters which were common not long ago, and even the dreaded Cape Hatteras has lost much of its terror. There are no records of the volume of business which is done in the coasting trade, but the fact that the licensed tonnage in the coasting trade and fisheries grew from 3,160,917 tons in 1860 to 6,782,082 in 1912, coupled with the fact that the tonnage of steam vessels increased from 770,641 tons in 1860 to 4,543,276 in 1912, attests its growth. Consult *Annual Reports* of the Commissioner of Navigation.

COAST LINE. See SHORE.

COAST PILOT. A pilot licensed to conduct vessels from one part of the coast to another. He is expected to be familiar with all buoys, beacons, lighthouses, and other aids to navigation along the part of the coast for which he pilots, and to have such a knowledge of the soundings, currents, weather, etc., as to enable him to conduct safely a vessel in thick or bad weather or at night. Upon reaching the entrance to a port the local pilots take charge of the vessel. The term *Coast Pilot* is also applied to a series of volumes published by the United States Coast and Geodetic Survey which give information in regard to the coast of the United States in great detail. See COAST AND GEODETIC SURVEY, U. S.

COAST RANGE. The system of uplifts which extends along the Pacific coast with interruptions from southern California to the Strait of Juan de Fuca in Washington (Map: United States, A 2). The name is also given to the range of mountains that defines the coast line of British Columbia and which is flanked by the Island Range on the west and merges into the Cascades towards the east. The Coast Range of the United States has its beginning where it meets the Sierra Nevada Range in the San Rafael Mountains, near Santa Barbara, southern California. Thence the line of elevation is continued in a general north-northwesterly direction by the Mount Diablo Range, the San Benito Range, and the one known locally as the "Coast Range" rising abruptly from the shore line. At San Francisco Bay a great rift is made, all ranges sloping down to the rocky hills through which this body of water has broken. The highest points in these ranges are San Carlos (5470 feet) and Mount Hamilton, on which is situated Lick Observatory (4450 feet).

Throughout northern California the Coast Range is continued through the Trinity Mountains, thence turning eastward through the Scott Mountains, throwing off branches to the south and west, but continues north again in the Siskiyous. Groups near the Oregon boundary

diverge to the east and connect with the Cascade Range. Farther north, the Coast Range in Oregon and Washington has less marked uplifts, the elevations averaging only from 1000 to 3000 feet. The Olympic Mountains, however, near the Strait of Juan de Fuca in Washington, include several peaks of considerable elevation, the highest being Mount Olympus, with an altitude of 8150 feet. The mountains of southern California below the San Rafael Mountains are sometimes called part of the Coast Range, but may more properly be considered a continuation of the Sierra Nevada. Their peaks are higher than in the north, numbering among them San Bernardino Mountain, 10,630 feet; San Jacinto Mountain, 10,805; Tehachapi Peak, 9214, and Pinos Mountain, 9214. The Coast Range presents no marked barrier to the drainage of the coastal region. This is due both to the interrupted character of the range and to its low altitude. The principal rivers crossing it are the Chehalis, Columbia, Umpqua, Rogue, Klamath, Eel, Sacramento, Santa Maria, and Siuslaw. The Salinas River occupies the valley between the parallel ranges of southern California and flows into the Bay of Monterey. See CALIFORNIA; OREGON; WASHINGTON; BRITISH COLUMBIA.

COAST-RANGE TROUT. A local name in California for the rainbow trout (q.v.).

COATBRIDGE, kōt'brij. A prominent and prosperous town of Lanarkshire, Scotland, 9 miles east of Glasgow (Map: Scotland, D 4). The town is in the centre of a mineral district, coal being the most important product. Its products include malleable iron, fire brick, tiles, tin plate, wire, tubes, and boilers. Owing to the great increase in the iron trade, Coatbridge has grown rapidly in size and prosperity since 1825, when James Baird put up furnaces. Educational institutions include a technical school, a mining college, and the Baird Institute. Pop., 1841, 1599; 1901, 36,981; 1911, 43,286.

COATES'VILLE. A borough in Chester Co., Pa., 39 miles (direct) west of Philadelphia, on the Pennsylvania and the Philadelphia and Reading railroads (Map: Pennsylvania, K 8). It contains a fine Y. M. C. A. building, a hospital, and is noted as an industrial centre, the establishments including iron and steel works, steel-plate mills, boiler works, brass and iron foundries, machine shops, a tube mill, silk mills, and factories of tobacco, phosphate, and automobiles. Settled about 1800, Coatesville was incorporated in 1867. The government is vested in a burgess, elected every three years, and a borough council chosen on a general ticket. There are municipal water works. Pop., 1900, 5721; 1910, 11,084.

COATI, kō-ä'tē, or COATI-MONDI. The native Brazilian name of certain tropical raccoons of the genus *Nasua* and the family Procyonidæ. They are not unlike the typical raccoons in many of their characteristics, but the body is more elongated. They are from 2 to 3 feet long and are chiefly remarkable for the elongation of the snout, which is a sort of flexible proboscis and is used in search of food and in rooting up the earth to obtain worms and insects. They are often domesticated in South America and are very affectionate, active, troublesome, and amusing. They are arboreal in their habits and, besides insects, eat birds and their eggs. The colors are extremely variable, but as a rule only two species are recognized, the Mexican coati (*Nasua nasica*, or *narica*) and the Brazilian red coati (*Nasua rufa*). The former is brownish gray and is found from Panama northward to southern Mexico. The other is reddish brown and occurs throughout South America east of the Andes. In the Pleistocene these animals were abundant, judging from their fossil remains, and at least one species was much larger than any living one. Consult: *Pop. Science Monthly*, vol. ii (New York, 1872); *American Naturalist*, vol. x (Boston, 1877); *Proc. U. S. National Museum* (Washington, 1889). See Plate of AMERICAN MINOR CARNIVORES under CARNIVORA.

COATICOOK, kō-ăt'ĭ-kụk. A town and port of entry in Stanstead Co., Quebec, Canada, on the Coaticook River and the Grand Trunk Railway 120 miles (direct) south by west of Quebec (Map: Quebec, G 5). It is a manufacturing and industrial centre and has a United States consulate. The manufactured products include fabrics, butter and cheese, chemicals, woolens, cream, sashes, doors, chairs, flour, shingles, lifting jacks, patent medicines, bricks, and knit goods. Pop., 1901, 2880; 1911, 3165.

COAT OF ARMS. In heraldry, "a complete armorial composition, to be charged upon a shield or banner." It is a relic of the armorial insignia which were embroidered upon a cloth worn over the armor, to render a knight conspicuous in battle. See HERALDRY.

COAT OF ARMS, NATIONAL. The coats of arms officially sanctioned by modern national governments represent, in most cases, the family heraldic insignia of their sovereigns. See HERALDRY.

COAT OF MAIL. Body armor composed of interlaced steel links. These links averaged about three-eighths of an inch in diameter, and there were two main styles. In the first, one end of the slender steel rod was flattened and pierced, the other brought to a point and turned up; the rod was then curved, the point thrust through the hole in the flat end and riveted; in the second form both ends of the rod were flattened and pierced, it was bent in a circle and the superimposed ends joined with a rivet. At the time of the Norman Conquest coats of mail were loose, shirtlike garments extending from the neck to the knees, with sleeves to the elbows; the skirts were split front and back for ease in the saddle. In the days of Richard Cœur de Lion the vogue of mail was at its height. The legs and feet were protected by leggings of this material, apparently laced behind, and a coif or hood attached to the coat covered the head and protected the throat and the face to the lips. By the end of the fourteenth century mail had practically passed out of use.

COATZACOALCOS, kō-ăt'sä-kō-äl'kōs, better known as PUERTO MEXICO. A port in the State of Vera Cruz, Mexico, on the Gulf of Campeche, at the mouth of the Coatzacoalcos River, 170 miles northeast of Oaxaca (Map: Mexico, M 8). It is the Atlantic terminus of the Tehuantepec National Railway and one of the busiest shipping centres in Mexico. The natural harbor has been deepened for heavy-draft steamers. Its port works are of the most modern construction. It has a United States consular agent. The exports consist chiefly of rubber and timber. Pop., 1910, 4200.

COATZACOALCOS, or SNAKE RIVER. A river of Mexico rising on the north slope of the Tuxtla volcano, in the Sierra Madre, flowing

most of the distance across the Isthmus of Tehuantepec, and emptying into the Gulf of Mexico (Map: Mexico, M 9). It has a length of about 220 miles and is navigable for 25 miles from its mouth.

COB, OLIVER. A character in Ben Jonson's *Every Man in His Humour.*

CO'BALT (Ger. *Kobalt;* possibly same as *Kobold,* goblin). Symbol, Co; atomic weight, 59.0; specific gravity, 8.5 to 8.9; melting point, 1467 C.

A metallic element discovered by Brandt in 1735. The word "cobalt" is found in the works of Paracelsus and other early writers and was used to designate minerals that suggested the appearance of metallic ores, but when smelted failed to yield any metal; hence the name "cobalt," signifying "sprite," was given to such minerals on account of the illusive character of their metallic constituents. It was also applied to certain blue pigments containing cobalt as far back as the times of the Greeks, but it was not until Brandt investigated the blue coloring of smalt that the elementary character of the metal was established.

The color of cobalt is steel gray with a reddish tinge. It possesses considerable lustre and will take a high polish, is ductile at red heat, and at ordinary temperature is hard and brittle. The metal by itself has practically no uses at the present time, but is admirably suited for cutting tools when alloyed with chromium, molybdenum, and tungsten. This alloy, known as "stellite," is the result of the investigations of Elwood Haynes of Kokomo, Ind., U. S. A. Cobalt is very magnetic, burns in oxygen with a red light, decomposes water at a red heat, dissolves slowly in hydrochloric and sulphuric and readily in dilute nitric acids, forming cobaltous salts. It absorbs carbon when heated in it; combines with sulphur, the halogens and phosphorus, arsenic, antimony, and bismuth; is easily precipitated from its solutions, and in other respects resembles nickel in its properties. When prepared by reduction by hydrogen, it is pyrophoric.

The element has been found free only in meteorites and has been detected in the solar atmosphere. The minerals of cobalt have been found in Saxony, Prussia, Bohemia, Hungary, France, Sweden, England, Spain, and in the Timiskaming district of Ontario, Canada, the last-named region being the greatest source of supply at the present time. The minerals occurring in sufficient quantities to be classed as ores are: linnæite, $(Co.\ Ni.\ Fe)_3\ S_4$, a cobalt-nickel-iron sulphide; smaltite, $CoAs_2$, a cobalt arsenide; cobaltite, (Co.Fe) AsS, a cobalt-iron sulpharsenide; wad, or earthy cobalt, (Co.Mn) O. $2MnO_2.4H_2O$, composed of oxides of cobalt and manganese; and cobalt bloom, or erythrine, $Co_3As_2O_8 + 8H_2O$, an arsenate of cobalt. Cobalt is nearly always present in nickel ores.

Cobalt combines with oxygen to form a monoxide or cobaltous oxide, CoO; a sesquioxide or cobaltic oxide, Co_2O_3; and a cobalto-cobaltic oxide, $CoCo_2O_4$, which is rather unstable and is generally considered as a mixture of the monoxide and the sesquioxide; they are all black and are reduced to metallic cobalt by carbon or hydrogen at a high temperature. Cobaltic oxide combines with water to form a dark-brown powder, $Co(OH)_3$, which when heated loses oxygen until the cobaltous-oxide stage is reached, at which point it remains stable. Of these oxides the most important is the cobalto-cobaltic oxide. In the commercial extraction of cobalt from its ores direct-fire methods are impracticable owing to the impurities present. The ore, matte, speiss (which may be the result of the separation from nickel), or slag containing the cobalt, is treated by wet methods and aims at the recovery of the cobalt as cobalto-cobaltic oxides. Smalt, other compounds, and metallic cobalt may then be prepared from the oxide. Zaffre is an impure oxide obtained by roasting cobalt ore and mixing with sand. By far the greatest quantity of the oxides is converted into smalt, also called *bleu d'azur* and *bleu de saxe,* which consists essentially of cobalt silicate and potash and is employed as a pigment for coloring glass by enamelers and potters for the production of the finest blue glaze on porcelain.

The silicate of cobalt itself is an exceedingly strong coloring agent, surpassed only by gold, one-tenth of 1 per cent imparting a deep-blue color to glass. Other pigments which are produced in smaller quantities are the phosphate; arsenate (known as red oxide of cobalt); cob bronze, a double phosphate of cobalt and ammonium; cobalt blue, also known as cobalt ultramarine and Thenard's blue, which is produced by heating an intimate mixture of alumina and the oxides; Rinman's green, or cobalt green, a mixture of the oxides and zinc oxide, which is also subjected to heat in its preparation. The principal salts of cobalt are those derived from the cobaltous oxide, viz., cobaltous sulphide, CoS; cobaltous sulphate, $CoSO_4 + 7H_2O$, which forms double salts with ammonium sulphate, $(NH_4)_2SO_4$, and serves, like nickel, for the electric deposition of the metal; cobaltous chloride $CoCl_2$, which is used as the basis of sympathetic inks; cobaltamines, so called, which are composed of cobaltic chloride, Co_2Cl_6, and varying amounts of ammonia, and are formed by the oxidation of ammoniacal solutions of cobaltous chloride, and when heated are converted into pure cobalt.

The world's estimated consumption of cobalt oxide during 1912 was 350 tons, valued at $560,000. Consult Schnabel, *Handbook of Metallurgy,* and *Metallurgical and Chemical Engineering,* vol. xii, No. 3, p. 184 (March, 1914).

COBALT. A town on Cobalt Lake, in the Timiskaming district, in the northern part of Ontario, Canada, 330 miles north of Toronto, and 103 miles north of North Bay, on the Timiskaming and Northern Ontario Railway. Rich deposits containing silver, nickel, bismuth, cobalt, copper, lead, and zinc were discovered in 1903. Claims were first worked in 1904. The yield of silver was remarkably rich. The ores were found to carry up to 3000 and 4000 ounces of silver to the ton of 2000 pounds. In 1904 the shipments of ore amounted to 158 tons, valued at $136,217. A rush to the locality set in in 1906. At the end of that year there were 20 large mines in operation, and in 1912 the output amounted to 30,322,805 ounces, valued at $17,455,080. On June 6, 1912, a large part of the town was destroyed by fire, but it was soon rebuilt. Being the centre of the richest of existing silver-mining districts, Cobalt has some of the characteristics of a mining camp. The manufacturing industries include a sampling plant, a machine shop and foundry, and 13 concentrators. An electric railway runs to Haileybury, 5 miles, and to New Liskeard, 10 miles. Pop., 1911, 5638.

CO'BALTITE. A mineral cobalt sulpharsenide, whose composition is CoAsS. It crystallizes in the isometric crystals which resemble those of pyrite (q.v.), has a metallic lustre, and is silver white, tending to red, in color. Cobaltite occurs in association with other metallic sulphides, especially those of lead and silver, and is found in Sweden, where excellent crystals are known; also in Norway, and at various localities in Silesia, but not in the United States to any extent. When present in sufficient quantities, it is a valuable ore of cobalt.

COBÁN, kō-bän'. The capital of the Department of Alta Vera Paz, Guatemala, on the Rio Cojabón, about 90 miles north of the city of Guatemala (Map: Central America, B 3). It is picturesquely situated on the slopes of a hill and is irregularly built. Its modern buildings are of some merit. The town has minor manufactures and is the centre of a fertile district producing coffee, cacao, vanilla, and sugar cane. Pop., 1900, 24,475; 1904, 30,770.

COBB, HENRY IVES (1859–). An American architect. He was born in Brookline, Mass., and was educated at the Massachusetts Institute of Technology and at Harvard, where he graduated in 1880. He was architect of the Opera House, the Newberry Library, the University of Chicago, and the church of the Atonement in Chicago, and of the Pennsylvania State Capitol. In 1893 he was one of the National Board of Architects for the World's Columbian Exposition, for which he designed the Horticultural Hall, and was retained as special architect by the United States government from 1893 to 1903. Among others of his more recent works the most important are the city hall and courthouse building in Chicago, and in 1913 the Booth Memorial Theatre in New York.

COBB, HOWELL (1815–68). An American politician. He was born in Jefferson Co., Ga., graduated at Franklin College in 1834, and was admitted to the bar in 1836. From 1837 to 1840 he was Solicitor-General of his State, and from 1843 to 1851 was a member of Congress. In 1849 he was elected Speaker of the House. He was one of the leaders of the Southern party in Congress and favored the extension of slavery into the territory acquired from Mexico. He was chosen Governor of Georgia in 1851 and was again sent to Congress in 1855. He was Secretary of the Treasury in Buchanan's cabinet, but resigned in 1860 to join the South in the approaching war. He was the president of the congress that drafted and adopted the Confederate constitution, but antagonism to Jefferson Davis compelled his retirement from the Secession administration. He was appointed major general in the Southern army, but did not take part in any considerable military operations. In defense of slavery he published *A Scriptural Examination of the Institution of Slavery* (1856).

COBB, NATHAN AUGUSTUS (1859–). An American agriculturalist, born at Spencer, Mass., and educated at Worcester Polytechnic Institute and the University of Jena. He was professor of chemistry and natural science at Williston Seminary, Mass. (1881–87), between 1891 and 1904 served as pathologist in the Department of Agriculture in New South Wales, for three years directed the division of physiology and pathology of the Hawaiian Sugar Planters' Experiment Station at Honolulu, and became agricultural technologist of the United States Department of Agriculture (1907), and also acting assistant chief of the Bureau of Plant Industry (1911). He discovered and described a large number of new species of plants and animals and patented several photographic devices. He published: *Elements of Chemistry* (1885); *Seed Wheat* (1903); *Universal Nomenclature of Wheat* (1905); *Methods of Using the Microscope, Camera-Lucida, and Solar Projector for Purposes of Examination and the Production of Illustrations* (1905); *Fungus Maladics of the Sugar Cane* (3d ed., 1909).

COBB, SYLVANUS (1799–1866). An American Universalist minister, born at Norway, Me. He edited the *Christian Freeman* of Boston, for 20 years, and published *The New Testament, with Explanatory Notes* (1864), *A Compend of Divinity*, and *Discussions*. He was prominent in antislavery and temperance movements. His son SYLVANUS (1823–87) was a prolific and very popular writer of tales and sketches of adventure, especially for the New York *Ledger*. He published a *Memoir* accompanying his father's *Autobiography* (Boston, 1867).

COBB, THOMAS REED ROOTES (1823–62). An American lawyer and author. He was born at Cherry Hill, Ga., graduated in 1841 at the University of Georgia, and from 1849 to 1857 was a reporter of the State Supreme Court. During the Civil War he served in the Confederate Congress, where for a time he was chairman of the Committee on Military Affairs. He afterward became a brigadier general in the Confederate army and fell at Fredericksburg. He published: *Digest of the Statute Laws of Georgia* (1851); *Inquiry into the Law of Negro Slavery in the United States* (1858); *Historical Sketch of Slavery, from the Earliest Periods* (1859); *The Colonel* (1897).

COBB, WILLIAM HENRY (1846–). An American librarian, born at Rochester, Mass. He was educated at Amherst College. In 1872 he was ordained to the Congregational ministry. He was pastor at Plymouth, Mass. (1872–76), and at Uxbridge, Mass. (1878–87). In 1887 he became librarian of the Congregational Library and assistant treasurer of the American Congregational Association at Boston, and in 1889 he was also coeditor of the *Journal of Biblical Literature*. He is author of *A Criticism of Systems of Hebrew Metre* (1905).

COBBE, kōb, FRANCES POWER (1822–1904). An English philanthropist and author. She was born in Dublin and was the great-granddaughter of Charles Cobbe, Archbishop of Dublin. Though brought up in an atmosphere of evangelical piety and sent to a fashionable boarding school, which proved to be torture to her vigorous, independent spirit, yet her early study of theological, ethical, and religious subjects finally brought her to the acceptance of the doctrines of theism. In 1857, after a year of travel in Italy, she joined Mary Carpenter at Bristol in conducting schools and reformatories for girls. She contributed articles to *Macmillan's* and other magazines and weeklies and, beginning in 1867, was for seven years an editorial writer for the *Echo*, a London daily. Later she wrote for the *Standard*. During this period her special subjects were the suffrage and property rights for women, and vivisection. She was long one of the foremost opponents of vivisection in England, and, when the columns of the newspapers were closed to her for the discussion of this subject, she established a monthly periodical for that purpose. Her published works make a long list. They

are all characterized by a remarkably fluent and forcible style. Among them are: *Intuitve Morals* (1855); *Religious Duty* (1857); *Pursuits of Women* (1863); *Broken Lights* (1864); *Darwinism in Morals* (1872); *Hopes of the Human Race* (1874); *Duties of Women* (1880; 9th ed., 1905); *The Scientific Spirit of the Age* (1888); *The Modern Rack: Papers on Vivisection* (1889); *Vivisection in America* (4th ed., 1890); and a charming *Autobiography* (2 vols., London, 1894; new ed., 1904).

COB'BETT, WILLIAM (1762–1835). An English political writer. He was born March 9, 1762, at Farnham, Surrey, where his father, a peasant farmer, trained him in habits of industry and self-dependence. He took a dislike to rural occupations and at 16 years of age went to London, where he was employed as a copying clerk; but, this becoming distasteful, he enlisted in the Fifty-fourth Regiment of Infantry, which shortly afterward went to Nova Scotia. He remained in the regiment eight years and by good conduct, activity, and intelligence became sergeant major. During this period he devoted his leisure to self-education. On his return to England in 1791 he obtained his discharge through the kind offices of Lord Edward Fitzgerald, married, and later went to France, where he learned the language. In the following year he went to America and, failing in an attempt to obtain a government position, supported himself for a time at Wilmington, Del., teaching English to French immigrants, Talleyrand being one of his pupils. He settled in Philadelphia and became a political writer. Under the signature of "Peter Porcupine" he was as keen a Tory as in later life he was a Radical, and, being stung by disparaging criticism of his mother country, he lashed American democracy and French republicanism with coarse, bitter, and personal scorn. Twice prosecuted for libel, he left America in June, 1800, and returned to England, where, in January, 1802, he started his famous *Weekly Political Register*, which continued uninterruptedly until his death. At first Tory, the *Register* gradually changed its politics and became the determined opponent of the government and the uncompromising champion of Radicalism. Having previously been found guilty twice of libel on certain members of the government, he was in 1810 fined £1000 and sentenced to two years' imprisonment in Newgate for his severe comments in the *Register* upon the flogging of five militiamen by Hessian mercenaries. In sore financial straits, and again in danger of imprisonment for free speech, Cobbett returned to America in 1817, and for two years farmed on Long Island, transmitting his articles for the *Register* with unfailing regularity. On his return to England in 1820 his strange whim of transporting the bones and relics of Thomas Paine, whom he had formerly reviled and now fulsomely eulogized, met with contempt and ridicule. He established a seed farm at Kensington and for some years engaged in agriculture. In 1829–30 he traversed England and Scotland on horseback, delivering political lectures in the principal towns, and he was received everywhere with enthusiasm as the most powerful advocate of the people's rights. In 1832 he was returned to the first Reform Parliament as member for Oldham. His first speeches did not add to his reputation, but caused amusement, Peel blandly informing him that they would receive the attention due to any "respectable member," but he eventually gained a respectful hearing. He was engaged in a debate on the malt tax just before his death at Normandy Farm, near Guildford, June 18, 1835. Cobbett is one of the great newspaper men of all time. His earlier tracts, such as *A Bone to Gnaw for the Democrats*, were widely circulated, but the success of his *Political Register* as a newspaper medium has never yet been surpassed. This came about partly because of his style,—his sentences short, terse, in the vernacular, his broad humor, picturesque caricature, and striking epigrams; and partly also because of the fearless and long-protracted onslaught on intrenched privileges which characterized Cobbett through the first third of the nineteenth century. Cobbett was also greatly interested in agriculture, about which he knew much, and in banking and currency, about which he knew little. He was the compiler of the *Parliamentary History* (London, 1806), which after 1812 was published as Hansard's *Debates*, and originated Howell's *State Trials* (ib., 1809–28). Among his best-known works are his *Grammar of the English Language* (1819), *Rural Rides* (1830), *Cottage Economy* (1822), and *Advice to Young Men and Women* (1829). His *History of the Protestant Reformation* (2 parts, 1824–27) attacks the Reformers, defends Roman Catholicism, and, often translated, has been extensively circulated in France and Italy. His sons published an annotated abridgment of his political works (9 vols., 1848). While not a man of the first order of intellect, and excluded from the higher refinements of thought, in matters of common sense Cobbett exhibited vigor far surpassing that of any other writer of his day. Despite crotchets, he rendered lasting service to the cause of the people. Consult: his autobiographical *Life and Adventures of Peter Porcupine* (Philadelphia, 1798); E. Smith, *Life of Cobbett* (2 vols., London, 1878); Huish, *Life of Cobbett* (ib., 1836); Waters, *Cobbett and his Grammar* (New York, 1883); Watson, *Biographies of Wilkes and Cobbett* (London, 1870); Carlyle, *William Cobbett* (ib., 1904); "Lewis Melville," *The Life and Letters of William Cobbett in England and America* (ib., 1913).

COB'BLER, or **COBBLER FISH.** 1. See KILLIFISH. 2. See THREADFISH.

COBBLER OF PRESTON, THE. A musical burlesque by Charles Johnson, produced in 1716 and altered a century later. Its plot was suggested by the adventures of Christopher Sly in Shakespeare's *Taming of the Shrew*.

COB'BOLD, THOMAS SPENCER (1828–86). An English scientist, born at Ipswich. He studied anatomy under Crosse and later took the regular medical course at the University of Edinburgh. In 1857 he went to London, and from 1857 to 1861 he lectured on botany at St. Mary's Hospital. In 1861 he began his lectures at the Middlesex Hospital, and subsequently, while practicing medicine, also lectured on geology at the British Museum. In 1873 he was made professor of botany and later acted as professor of helminthology at the Royal Veterinary College. Although he was a scientist in the broadest sense of the term, his investigations were chiefly in the field of helminthology, the science of parasitic worms; and his published works deal chiefly with subjects of this science. His writings include: *Entozoa: An Introduction to the Study of Helminthology, with Reference More Particularly to the Internal Parasites of*

Man (1864, and supplement, 1869); *Tapeworms* (1866); *Worms* (1872); *Parasites* (1879); *The Parasites of Elephants* (1882); *Human Parasites* (1882); *Parasites of Meat and Prepared Flesh Foods* (1884); also a large number of memoirs published in scientific periodicals.

COB'DEN, RICHARD (1804–65). An English statesman and economist known as the Apostle of Free Trade. He was born in the hamlet of Heyshott, near Midhurst, in Sussex, on June 3, 1804, of a family which for centuries had been settled in the place. His father was a sweet-natured, incapable man, who proved unequal to the task of supporting his family. In 1814 the farm was sold, and young Cobden was sent off to be educated at a Yorkshire school, where he learned nothing and suffered much for five unhappy years. In 1819 he entered his uncle's warehouse in Old Change, London, and devoted himself with great energy to his new business, finding time, nevertheless, at nights, for study and reading. At 21 he was a commercial traveler for his uncle's house and loved the business for the opportunities it gave him of studying men and things. In 1828 he set up as the commission agent of a large manufacturing house in Manchester on a capital consisting mainly of energy, ability, and his good name. In 1831 he and his partners had prospered sufficiently to start in business for themselves as calico printers at Sabden, near Clitheroe, and in the following year branches were established in London and Manchester. The "Cobden prints," tasteful and original in design, became famous, and the partners were speedily on the way to the accumulation of a large fortune. In 1832 Cobden settled in Manchester, and from that time his private affairs became secondary to the interest which he displayed in the broad practical principles of economics and public education. From 1832 to 1835 he must have been busy educating himself, for this was the only time during his early life when he could have found the leisure to acquire the profound knowledge of political history and economics for which he was distinguished. Reading and foreign travel continued to the last to be a great passion of his life.

In 1835 Cobden published a pamphlet entitled *England, Ireland, and America,* "by a Manchester Manufacturer," and this was followed in 1836 by another pamphlet on *Russia.* These two pamphlets were epoch making, in that they boldly challenged the prevalent ideas of foreign policy and foreign trade in England. It would seem that the sober-minded Cobden, an enthusiast in his way, had become convinced that commerce was the great torchbearer of civilization and the great foundation of national prosperity. Anything, therefore, which interfered with the free exchange of commodities between nation and nation was harmful, and for this reason protection, which dammed the current of trade, and war, which sought entirely to destroy it, were pernicious. He attacked the historical English policy of intervention in European affairs, on the ground that it bred interminable wars in Europe, while it crushed the English taxpayer with the burden of an enormous debt. The balance of power, the political ideal for which so many sanguinary contests had been fought, Cobden ridiculed as an impossible adjustment which, in spite of centuries of bloodshed and diplomacy, still left statesmen facing an obstinate, unstable equilibrium. He strongly deprecated, too, the prevailing spirit of hatred for Russia, the great bugbear of English statesmen. Summed up, his plea was for the principles of peace, nonintervention, and a policy of retrenchment and free trade as a means of husbanding the national resources for the great economic struggle that was fast approaching with the entrance of the United States into the markets of the world. In 1835 he made a brief tour in the United States and Canada. In the winter and spring of 1836–37 Cobden traveled in Spain, Turkey, and Egypt. On his return he entered into Manchester municipal politics, being one of those who secured the incorporation of that city in 1838. Popular education was a subject of great interest to him, and he discussed it in many public speeches. In 1837 he was a candidate for Parliament at Stockport, but was defeated.

The history of Cobden's connection with the Anti-Corn-Law agitation began in October, 1838, when an Anti-Corn-Law association was founded in Manchester. (See CORN LAWS.) Cobden was one of its earliest members and soon became its guiding spirit. He converted the Manchester Chamber of Commerce to his views and made it a powerful instrument of agitation. Anti-Corn Law associations were founded in many towns of the north, and in London, in March, 1839, the delegates of the various associations united to form the Anti-Corn-Law League, of which Cobden and six others constituted the council. From the first he was the soul of the movement, and to the people at large he seemed to be the embodiment of the cause. With magnificent talents for organization, with an unequaled gift for popular oratory, and, above all, with his kindling enthusiasm and tremendous capacity for work, he was what would be called in modern parlance campaign manager, press bureau, and stump speaker all in one. The history of the Anti-Corn-Law agitation belongs properly elsewhere, but Cobden's activity is so identified with the work of the League that the two can hardly be separated. Wonderful instances are quoted of the sudden conversion of hostile audiences in country and town, as they listened to Cobden's simple, sincere, and irrefutable arguments; and his success in his "campaign of education" was all the more rapid in that his teachings confined themselves to driving home the elemental truth that food is a desirable thing for people who starve. In 1841 he entered Parliament from Stockport. His reception in the House was not friendly; but his evident sincerity and his straightforward, unanswerable arguments always gained him a hearing. At the beginning of the session Mr. Charles Villiers's annual motion to consider the repeal of the Corn Laws was rejected by a vote of 393 to 90, yet within five years after he had entered Parliament, Cobden had converted Sir Robert Peel and his party to free trade. In 1843 considerable odium was heaped upon his name as the result of an attack on the government, which Peel unjustly took to be an exhortation to personal violence against himself. Cobden, however, was undaunted, and continued to plead, in Parliament and out, against the "system of legislative murder" which "starved people to death." On March 13, 1845, he delivered an especially powerful speech in the House, at the end of which Peel is said to have muttered, "Those may answer him who can, I cannot do it." The famine in Ireland came to the aid of the Anti-Corn-Law League. On

Dec. 5, 1845, the Prime Minister pronounced for the total repeal of the Corn Laws, and in 1846 the battle had been won. Speaking in Parliament in that year, Peel declared that to Cobden was due the honor for the great reform which had just been enacted. That the intense earnestness which animated Cobden throughout the struggle was something more than enthusiasm for a principle in economics is shown in the following words of John Bright, his lifelong friend and supporter, spoken at the unveiling of Cobden's monument at Bradford in 1877. It was in September, 1841, and Bright was mourning over the dead body of his young wife when Cobden came to him, saying: "There are thousands of houses in England at this moment where wives, mothers, and children are dying of hunger. Now, when the first paroxysm of your grief has passed, I would advise you to come with me, and we will never rest until the Corn Law is repealed." The struggle and the triumph are thus described by Mr. Bright: "We were joined, not by scores, but by hundreds, and afterward by thousands, and afterward by countless multitudes; and afterward, famine itself, against which we had warred, joined in. A great minister was converted, and minorities became majorities, and finally the barrier was entirely thrown down, and since then, though there has been suffering, and much suffering, in many homes in England, no wife, and no mother, and no little child has been starved to death as a result of famine made by law."

During the agitation for the repeal of the Corn Laws, Cobden had neglected his own affairs entirely, and at the end he was a poor man. A popular subscription of more than £75,000 was made up for him and he went abroad for rest. His nature, however, was opposed to rest, and during his long travels in France, Spain, Italy, Germany, and Russia, he did not cease to advocate in public speeches and interviews with sovereigns and statesmen the great principles of free trade, peace, and nonintervention. During his absence he was elected to Parliament from the West Riding of Yorkshire (1847), and on his return to England he affiliated himself with numerous peace societies and subsequently attended a number of international peace congresses in Paris, Frankfort, and London. In 1849 he moved in Parliament that action be taken towards the establishment of international arbitration, and in 1851 he proposed a general reduction of armaments. He was active in combating the periodic outbursts of anti-Gallic and anti-Russian fever such as that which spread over the country in 1853, and lost thereby that immense popularity which he had acquired in the struggle against the Corn Laws. He bitterly assailed Palmerston's policy of active intervention in European affairs, and with John Bright opposed the war against Russia in 1854, for which he was virulently assailed by the unanimous voice of a war-mad nation. Far from considering the preservation of Turkey as desirable, Cobden maintained that the downfall of the Ottoman Empire in Europe would redound to the welfare of the Christian peoples of the Balkans and to the cause of civilization. In 1857, as the result of an attack by Cobden on the Chinese policy of the cabinet, the Palmerston ministry was outvoted and forced to appeal to the country. Cobden stood for Huddersfield, but his unpopularity on account of his attitude towards the war recently ended was still great and he was defeated. In 1859 he came to the United States, this being his second visit after a lapse of 24 years. On his return the post of President of the Board of Trade was offered him by Palmerston, with a place in the cabinet. Against the urgent advice of his friends, Cobden declined the offer, refusing frankly to take sides with a man from whom he differed *toto cœlo* on matters of foreign policy. At the suggestion of M. Chevalier, the eminent champion of free trade, Cobden went to France in 1859 to attempt the negotiation of a commercial treaty between that country and England. He possessed the support of none of the English ministers save Gladstone, but his reputation was such that in his unofficial capacity he succeeded in converting the French Emperor and his ministers to his views. In January, 1860, Cobden was clothed with official authority and in the same month the treaty was concluded. He remained in Paris until November, accomplishing the tremendous labor necessary in the minute adjustment of a new tariff schedule. On returning to England he declined the offer of a baronetcy and resumed his activity in Parliament. With John Bright he earnestly supported the cause of the North in the Civil War, and in Parliament severely criticized the course of the government in permitting the equipment of Confederate cruisers for the purpose of preying on American commerce. His last speech in Parliament was delivered in July, 1864. He contracted serious bronchial trouble as the result of exposure in traveling on a public mission to London, and died there, July 2, 1865. His death was acknowledged as a national loss by men of such widely differing opinions as Palmerston, Disraeli, and John Bright, and was received with sorrow in France and other countries of the Continent.

Cobden's *Speeches on Questions of Public Policy* were published by his friends John Bright and Thorold Rogers in 1870. The best biography is that by John Morley, *Richard Cobden's Life* (London, 1881; New York, 1908). Consult also Garnier, *Richard Cobden, les ligueurs et la ligue* (Paris, 1846); Bastiat, *Cobden, et la ligue ou l'agitation pour la liberté du commerce* (Paris, 1848); Walpole, *Studies in Biography* (New York, 1907); MacCunn, *Six Radical Thinkers* (ib., 1910).

COBDEN CLUB. An association of leading free traders instituted in London in 1866, in honor of Richard Cobden (q.v.), with the object of diffusing in all parts of the world those principles with which his name is connected. For this purpose it has published tracts, pamphlets, and books for free circulation, especially in Great Britain, the United States, and the British colonies.

COBEGO, kō-bā'gō, or **KAGUAN,** kä'gwän. The native name of a singular group of East Indian flying insectivores, constituting the family Galeopithecidæ and genus *Galeopithecus*, having one species (*Galeopithecus volans*) and perhaps one or two others. They are known in the Malayan region as cobegos, colugos, kaguans, kubongs, etc., and in many books as flying lemurs, this aberrant and puzzling group having at first been considered lemuroids. But the scientific name, meaning "weasel monkey," is no more appropriate than lemur, for this creature is neither the one nor the other, but rather a distant cousin of moles and shrews. Even here we have the anomaly of an animal classed with the insectivores which, in diet, is wholly a vege-

tarian. They are slender, long-limbed, large-clawed, long-tailed, fox-headed animals, about 18 inches in length, clothed in exquisitely soft, short and protectively mottled fur, and provided with a folded extension of the skin which extends from the neck nearly to the tip of the tail and includes the feet, which are fully webbed. This parachute thus equals that of the best-furnished bats in extent, but it is furry both above and below. In flight the cobego does not equal bats, but it can sail longer distances, and come nearer to guiding its course, than do any other "flying" mammals. It is wholly arboreal in its life; in fact, on a flat surface it is as helpless as a bat, and flops awkwardly towards the nearest tree, the mode of progression resembling that of a seal. It becomes active mainly in the evening and early morning, disliking the glare of day, and impeded by the darkness of midnight. It spends most of its time scrambling about the branches or sailing from one tree trunk to another, and seems to feed upon anything vegetable that lies in its way, but mostly upon leaves and fruit. It has been said that in sleep it hangs head downward, clinging with its hind feet, and by means of the prehensile free tips of its tail, when it is nearly invisible among the flickering lights of the leaves. Like many of the owls, the cobego has two color phases, rufous and gray, which are wholly independent of age, sex, or season. The rufous is much the rarer, only about one in a dozen being of this hue. It is probable that only a single young is born at a time and this in a very imperfect stage of development, reminding one of the marsupials. The young animal sleeps hanging by all four feet, its head and tail curled inward, forming almost a circle. Consult: Wallace, *Malay Archipelago* (London, 1869); Moseley, *Notes by a Naturalist on the "Challenger"* (London, 1879); Beebe, *New York Zoölogical Society Bulletin* (New York, 1913).

COBET, kō-bĕt′, CAREL GABRIEL (1813–89). A brilliant Dutch classical scholar. He was born in Paris and studied from 1831 to 1836 in Leyden. In a journey to Italy at government cost in 1840–45 he studied carefully most of the Greek manuscripts in Italian libraries, and became thus an expert in paleography (q.v.) He became a professor at Leyden in 1847. Cobet was one of the most sagacious and acute of modern scholars in the criticism and emendation of Greek texts. He published, besides other works of high merit: *Oratio de Arte Interpretandi Grammatices et Critices Fundamentis Innixa*, his inaugural address, famous for its Latinity (1847); *Variæ Lectiones* (1854); *Novæ Lectiones* (1858); *Miscellanea Critica* (1876); *Collectanea Critica* (1878); works on Dionysius of Halicarnassus, and Xenophon; and editions of Diogenes Laërtius, Xenophon's *Anabasis* and *Hellenica*, Lysias, and Cornelius Nepos. From 1856 he was one of the editors of *Mnemosyne*, an important periodical devoted to the classics. Consult Sandys, *A History of Classical Scholarship*, vol. iii (Cambridge, 1908). See TEXTUAL CRITICISM.

COB'HAM, LORD. See OLDCASTLE, SIR JOHN.

CO'BIA, or **CRAB EATER.** See SERGEANT FISH.

COBIJA, kō-bē′hȧ. A seaport in the Province of Antofagasta, Chile, about 70 miles north of Antofagasta (Map: Chile, C 8). It was formerly a considerable town, but has lost its commerce and now contains a population of but 500. Cobija, once known as Puerto la Mar, was part of Bolivia and its only seaport until ceded to Chile in 1883. It suffered from an earthquake and tidal wave in 1877.

COBLENZ, or **KOBLENZ,** kō′blĕnts (corrupted from the Latin name *Confluentia*, or *Confluentes*, from *confluere*, to flow together, from *con-*, together + *fluere*, to flow). The capital of the Prussian Rhine Province, about 57 miles southeast of Cologne, beautifully situated at the junction of the Rhine and the Moselle (Map: Prussia, B 3). It consists of the old town, along the Moselle, and the new town, farther up the Rhine. Among the principal buildings are the church of St. Castor, founded early in the ninth century by the son of Charlemagne, containing the tomb of Archbishop Kuno of Falkenstein; the Liebfrauen Kirche ('Church of Our Lady') of the thirteenth century; the so-called Kaufhaus, built in 1477 as a town hall; the ancient Burg, erected by the Archbishop of Treves in 1276, restored by the town; and the large electoral palace, now a royal palace, completed in 1786. In 1905 the government completed a magnificent new building in which to centre the activities of the province. At the extreme point of the city, at the junction of the rivers, stands the splendid equestrian statue of Emperor William I, erected by the province. Coblenz has numerous and excellent educational institutions, including a royal gymnasium, a teachers' seminary, and a conservatory of music. Its chief industry is the production of the sparkling Moselle wine. There are also manufactures of ships, hats, machinery, pianos, and lacquered wares. A system of four forts, including Ehrenbreitstein on the opposite bank of the Rhine, makes it very formidable. Prince Metternich, the Austrian statesman, was born here in 1773. Pop., 1900, 45,146; 1905, 53,902; 1910, 56,487. Coblenz was known to the Romans as Confluentes. In 1018 it was conferred by Henry II upon the archbishops of Treves. After 1789 it was the headquarters of the French Emigrés, and in 1794 it passed to France. In 1815 it was ceded to Prussia. Consult: Daniel, *Deutschland* (Leipzig, 1895); W. A. Gunther, *Geschichte der Stadt Koblenz* (Coblenz, 1815); Bär, *Urkunden und Akten zur Geschichte der Verfassung und Verwaltung der Stadt Koblenz bis zum Jahre 1500* (Bonn, 1898).

COBNUT. See HAZELNUT.

COBOURG, kō′bĕrg. The capital of Northumberland Co., Ontario, Canada, on Lake Ontario and the Grand Trunk Railway, 69 miles east-northeast of Toronto (Map: Ontario, F 6). It is a port of entry, with a commodious harbor and regular steamship connections with Rochester, N. Y., Toronto, Montreal, and other American and Canadian ports. The town is well laid out and has notably fine public buildings. The manufacturing establishments include extensive car works, woolen and matting factories, steel works, woodworking, wire-fence, and canning factories. Cobourg is a well-known and popular summer resort. For many years Cobourg was the seat of Victoria University (Methodist), now federated with Toronto University. Electric power is generated for manufacturing purposes. Pop., 1901, 4239; 1911, 5074.

CO'BRA, or **COBRA DE CAPELLO,** kō′brȧ dā kȧ-pĕl′ō (Portug., hooded snake). One of a group of Oriental venomous snakes constituting the proteroglyphic genus *Naja*. There are six or seven species dwelling in Asia and Africa. Of the African species the best known is the

asp (*Naja haie*). (See ASP.) The Asiatic cobras are not large, except the "giant" cobra (*Naja bungarus*), which is sometimes 13 feet long. (See HAMADRYAD.) Several species belong mainly to the Malayan region and are comparatively small and harmless. None is American, the "cobras" of Brazil being something else, usually harmless.

The cobra de capello (*Naja tripudians*) is the most interesting one, as it is exceedingly numerous throughout India and Ceylon, thence westward to the Caspian, and eastward throughout the Malay Peninsula and into southern China; and is justly regarded as the most deadly of venomous serpents—certainly the most harmful considered in the aggregate, the annual mortality from its bite in India alone being many thousand human beings, besides a great quantity of live stock. Little can be done to prevent this, because of the religious veneration with which the "black snake" (the native name) is regarded by the larger part of the population. This species rarely exceeds 6 feet in length and is a rather slender, brownish snake (bluish beneath) with lighter crossbars; but the markings are variable. The head is small, without the triangular and separated appearance of the vipers; but when the snake is angry or excited and about to strike, it lifts from the ground a third of its length and spreads the nuchal ribs until the neck expands into a broad, shell-like hood of terrifying appearance; and the back of this hood displays a yellow mark, more or less of the shape of a pair of spectacles.

These cobras wander even up to elevations of 8000 feet in the Himalayas, but are most common in the lowland jungles, where they are able to climb trees, although they seldom do so; and as they can swim well they often enter the water after frogs, fish, etc. They are attracted to villages, enter gardens and houses in search of mice and other small mammals, or of eggs and young poultry, and are likely, especially during the rainy season, to take up their residence in old houses, broken walls, fodder stacks, and rubbish heaps, and remain there. It is about such places, especially at night, that they are most often trodden upon, and fatal bites are received. They are sluggish and strike rarely except when provoked or endangered, and they may be killed by a slight blow. Their bite, when well delivered by a vigorous snake, is almost surely fatal; men have been known to perish within half an hour, and in such cases all so-called remedies are useless. The immunity this snake receives among the Hindus is due to a belief that it once spread its hood as a shade over Buddha while he slept, and was blessed by the saint, who placed the spectacle mark upon its back as a warning to the kite not to molest it. Little headway can be made against this superstition in efforts towards extermination of this deadly reptile, which occasionally penetrates even the gardens and parks of large towns. Its natural enemies are few, chiefly the kite, the mungoos (q.v.), and cattle (by tramping).

Bibliography. For these and other poisonous snakes of the Old World, consult authorities referred to under SNAKE; also Fayrer, *Thanatophidia of India* (London, 1874); Ewart, *Poisonous Snakes of India* (ib., 1878); and especially Wall, *Journal Bombay Natural History Society*, vol. xxii (Bombay, 1913). See PROTEROGLYPHA; and Colored Plate of FOREIGN VENOMOUS SERPENTS with the article SNAKE.

COBRE, or **EL COBRE,** kō'brā. A small town in the Province of Santiago, Cuba, about 9 miles from Santiago de Cuba (Map: Cuba, K 6). It is the centre of a copper-mining district, and derives its name from that metal. Cobre dates from the sixteenth century, the mines having been exploited first in 1558. Pop., 1899, 1028; 1907, 1781.

COBURG, kō'bo͝orĸ (Lat. *Melocabus*). The capital of the Duchy of Coburg and, alternately with Gotha, the residence of the Duke of Saxe-Coburg-Gotha, picturesquely situated on the left bank of the Itz, a tributary of the Main, about 26 miles north-northeast of Bamberg (Map: Germany, D 3). Its principal public buildings are chiefly found on the Marktplatz and Schlossplatz. The former, adorned with a statue of Prince Albert, contains the old Rathaus, from the early seventeenth century, the handsome government buildings, the arsenal, with the Ducal Library of 100,000 volumes, and the town museum. The Schlossplatz contains the large palace erected in 1549 and restored in 1693, two smaller ducal palaces, and the theatre. The church of St. Moritz, a handsome Gothic structure, dating from the fifteenth century, contains some fine monuments and brasses. On a hill about 500 feet above the town stands the ancient castle of the dukes of Coburg, dating from the sixteenth century. It has been restored and is fitted up as a museum. The rooms which Luther occupied, when in concealment here in 1530, remain, as well as the pulpit from which he preached in the chapel of the castle. It has a gymnasium founded in 1604 by Duke John Casimir, commercial, agricultural, and other schools. There are flourishing industries of beer brewing, the weaving of woolen and linen fabrics, and the manufacture of porcelain and basket ware, machinery, colors, ironwork, and lumber. Pop., 1890, 17,106; 1900, 20,459; 1910, 23,794. The town of Coburg grew up around the castle and is mentioned for the first time in 1207. In 1485 it passed to the Ernestine line of Saxon dukes and became in 1735 the capital of Saxe-Coburg.

COBURG FAMILY. An old German ducal family, dating from the fifteenth century, which has contracted various alliances with the English and continental royal houses. Queen Victoria's mother was a sister of Duke Ernst I of Coburg. The first wife of Ernst's brother, Leopold I, King of Belgium, was a daughter of George IV, of England, and his second wife was a daughter of Louis Philippe. Albert (q.v.), the son of Ernst I, was the husband of Victoria.

COBURG PENINSULA. A peninsula on the north coast of Australia, bounded by the Van Diemen Gulf and the Arafura Sea. It extends in a northwesterly direction towards Melville Island, from which it is divided by Dundas Strait (Map: Australasia, F 4). On its northeast side is the bay known as Port Essington, at the head of which was established, in 1839, the settlement of Victoria—abandoned six years later because the red-clay soil could not be cultivated. The district abounds with swamp buffaloes which were originally imported from Java.

COBURN, FOSTER DWIGHT (1846–). An American agriculturist, born in Jefferson Co., Wis. He had a common-school education, served in the Civil War in Illinois regiments, and in 1867 settled in Kansas. The agriculture of Kansas owes much to his expert knowledge and enthusiasm. He became in 1882 and again in 1894 Secretary of the State Department of

Agriculture and was chief of the department of live stock at the St. Louis Exposition (1904). He was repeatedly a member of the board of regents of the State Agricultural College and president of the State Temperance Union. In 1906 he refused an appointment as United States Senator. He wrote many State reports and *Swine Husbandry* (1904); *Alfalfa* (1901); *The Book of Alfalfa* (1906); *Swine in America* (1909).

COBWEB. One of the four fairies that appear in Act iii, Scene 1, and Act iv, Scene 1, of Shakespeare's *Midsummer Night's Dream.*

CO'CA (So. Amer. name), *Erythroxylum coca.* A shrub of the family Linaceæ, the leaves of which are much used by the inhabitants of Peru and Bolivia as a narcotic and stimulant. (For illustration, see Plate of CORNFLOWER.) The dried leaves are chewed with a little finely powdered unslaked lime or with the alkaline ashes of the quinoa (q.v.), or certain other plants. The principal constituents of coca are cocaine and several derivatives, hygrine, cocatannic acid, etc. As a local anæsthetic the alkaloid cocaine is unexcelled. The common forms of administering are in the wine of coca, a fluid extract, and the alkaloid cocaine. The properties and effects of coca resemble those of opium, although it is less narcotic, while it possesses the property of dilating the pupil of the eye, which opium does not possess. It also lessens the desire for ordinary food, and for some time, at least, enables the person who uses it to endure greater and more protracted exertion than he otherwise could, and with less food. The leaves are sometimes mixed with forage for mules, when especially long trips are taken. It is especially remarkable for its property of preventing the difficulty of respiration, so common in the ascent of long and steep slopes at great elevations. But when used habitually and in excess, it weakens the digestion, produces biliary and other disorders, and finally induces a miserable ruin both of body and mind. It has been in use from a very remote period among the Indians of South America and was extensively cultivated before the Spanish conquest. Many of the Indians of the Peruvian Andes are to this day excessively addicted to it, and its use prevails also to a considerable extent among the other inhabitants of the same regions. Its culture and use have extended into Brazil. The shrub is extensively cultivated in various parts of South America and in Ceylon, India, and Java. It could probably be grown in parts of Florida and California. The shrub is 3 to 6 feet high, with rusty branches and leaves somewhat like tea leaves, which are borne on the ends of the branches, the small yellow flowers some distance below. The annual production of leaves in South American trade is estimated at 30,000,000 to 40,000,000 pounds. There are about 100 species of *Erythroxylum.* The name is from the red wood of some species.

COCADRILLE, kŏk'ȧ-drĭl. A monster described by Sir John Mandeville as living on the island of Silha and corresponding to the crocodile, of which the word is an early form.

COCAINE, kō'kȧ-ĭn, $C_{17}H_{21}NO_4$. An alkaloid derived from the leaves of a shrub, *Erythroxylum coca* (see COCA). The hydrochlorate, $C_{17}H_{21}NO_4$·HCl, produces temporary insensibility when applied to the conjunctiva, mucous membranes, or denuded surfaces, or when injected beneath the skin. It is not absorbed by the unbroken skin, however, unless by cataphoresis (q.v.). It also causes a temporary contraction of the blood vessels of the region anæsthetized, but this is followed by congestion. Applied to the conjunctiva, it causes anæsthesia, dilatation of the pupil, diminution of intraocular tension, and some interference with accommodation. For dilating the pupil it is sometimes employed in combination with homatropine (q.v.). As a local anæsthetic for regions covered by skin it is injected in solution, by a hypodermic needle, into the tissue which is to be anæsthetized. The toxic dose varies greatly, some persons being unfavorably affected by a small amount. The only result may be restlessness and excitement, or there may be headache, rapid respiration, delirium, coma, or convulsions, with wide dilatation of the pupils. Persons addicted to the cocaine habit use the drug internally or by subcutaneous injection. Its prolonged use causes digestive disturbance, muscular twitching, insomnia, mental, moral, and physical deterioration, and often death.

Within recent years cocaine has been successfully employed as an anæsthetic in major surgical operations: if injected into the spinal canal, cocaine has the remarkable effect of producing complete insensibility to pain in the entire part of the body below the point where it is injected, but no effect at all above that point. See ALKALOIDS.

COCAMA, kō-kä'mȧ. A tribe of Tupian stock, known also as the *Ucayales,* situated on the banks of the lower Ucayalí River, in northeastern Peru, particularly in the neighborhood of the great Cocama Lagune; also in the vicinity of Nauta, on the left bank of the Amazon, opposite the mouth of the Ucayalí. On the lower Huallagá are some Cocamas, who are known as *Cocamillas.* They are closely related to the Omaguas, or Campevas, another Tupian people of the higher Amazon. Besides the older notices in De Castelnau and Marcoy, consult the article of Dr. P. Rivet, "Les langues guaranies du Haut-Amazone," in the *Journal de la Société des Américanistes de Paris* for 1908.

COCANADA, kō'kȧ-nä'dȧ (corrupted from Telugu *kakinadi*). The capital of the Godavari District, Madras, India, 315 miles north-northeast of Madras, and after that city the principal port on the Coromandel coast (Map: India, D 5). Navigable canals connect it with the Godavari River at Dowlaishwaram. The commercial establishments and docks of the town are on the banks of one of these canals, which leads to the protected roadstead in Coringa Bay. In spite of a decline in its trade due to silting of the harbor, large quantities of cotton are exported, and there are exports also of rice, sugar, oil seeds, ghee, pulse, and tobacco. The principal industries are the manufacture of salt, ironwork, and cheroots. Pop., 1901, 48,096; 1911, 54,110.

COCCAI, MERLIN. See MERLIN COCCAI.

COCCEIANS, kŏk-sē'yanz. The name given to the adherents of Johannes Coccceius, the seventeenth-century theologian (q.v.), who held that the future history of Christianity was to be found foreshadowed in the Old Testament.

COCCE'IUS, NERVA, or **NERVA MARCUS** (?–33). The grandfather of the Emperor Nerva, elected consul 22 A.D. His legal learning is extolled by Tacitus, and he is frequently mentioned in the *Digest.* He had charge of public works under Tiberius, to whom he was

a constant companion. Notwithstanding the Emperor's entreaties, he starved himself to death, 33 A.D., because of continual ill health.

COCCEIUS, kŏk-tsā'yo͝os, or KOCH, JOHANNES (1603–69). A German Protestant theologian. He was born in Bremen and made his first studies there. In 1625 he went to Hamburg and acquired a thorough knowledge of Oriental languages under the guidance of a learned Jew. Returning to Bremen in 1630, he taught Hebrew there and was appointed professor of theology in Franeker in 1643 and in Leyden in 1650. Cocceius' chief work is the *Lexicon et Commentarius Sermonis Hebraici et Chaldaici Veteris Testamenti* (Leyden, 1669), the first tolerably complete dictionary of the Hebrew language. By a fanciful typology he found New Testament ideas in the Old Testament. The representation of a covenant between God and man he made the centre of his theology. This idea of two covenants—one of works, or that before the Fall, and one of grace, that after it—was first broached by William Ames (died 1633); but Cocceius elaborated it and so became the virtual founder of the federal theology (q.v.), which is found in the Westminster standards and was long accepted by the Reformed churches. The most complete exposition of his views is in his *Summa Doctrinæ de Fœdere et Testamento Dei* (1648). His collected works were issued in Amsterdam (1675), with a life by his son.

COCCEJI, kŏk-tsā'yē, HEINRICH VON, BARON (1644–1719). A German jurist. He was born at Bremen and studied jurisprudence and philosophy in Leyden and afterward in Paris and Oxford. He was made professor in Heidelberg in 1672 and in Utrecht in 1688, and two years later was appointed to a similar office in Frankfort-on-the-Oder. In 1712 he was created a baron of the realm. His work on German civil law, *Juris Publici Prudentia* (1695), was almost universally used as a textbook.

COCCEJI, SAMUEL VON, BARON (1679–1755). A German jurist, born in Heidelberg, son of the preceding. He became Prussian Minister of State and of War (1727), director of ecclesiastical affairs and curator general of the universities of the kingdom (1730), president of the High Court of Appeals (1731), chief of the Prussian judiciary (1738), and Chancellor (1747). He exerted the greatest influence upon the development of Prussian law. The legal codes prepared by him, and respectively entitled *Projekt des Corporis Juris Fridericiani Pomeranici* (1747) and *Projekt des Corporis Juris Fridericiani Marchici* (1748), remained in operation until 1780. Consult Trendelenburg, *Friedrich der Grosse und sein Grosskanzler Samuel von Cocceji* (Berlin, 1863).

COC'CIDÆ (Neo-Lat. nom. pl., from Lat. *coccum*, Gk. *κόκκος, kokkos,* berry). A family of bugs, including the scale bugs or bark lice, the mealy bugs, and others without popular names. This family not only departs the most widely from the Hemiptera, but in it the most anomalous forms among insects are found; and the most extraordinary diversities occur, even in the two sexes of the same species. The habit of secreting a shell or covering of some sort is common to all the Coccidæ, most frequently in the form of a scale made up of cast skins and excreted matter. Sometimes, as in the case of the mealy bugs, the covering is white and powdery; and in the "ground pearls" it is glassy or shell-like and may entirely incase the insect. A few gall-forming species occur in Australia. The young mitelike females at first have the power of locomotion. The perfect male has only one pair of wings, like flies. Sexual reproduction is the normal method, while parthenogenesis and viviparous reproduction, so common in the aphids, is a rare method among the Coccidæ. Almost complete histolysis may occur in the female, lasting for several years. The young of both sexes sink the rostrum into plants, suck the sap, and secrete a waxy coating or shield of some sort, under which they undergo subsequent development. Coccidæ occur on bark, leaves, and fruits of various trees, and as they are sap suckers they may greatly impoverish or kill the plant. The black or brown scalelike spots on oranges and lemons are really scale insects, and by the transportation of the fruit gain world-wide distribution. Honeydew is secreted by the Coccidæ, but usually not so plentifully as by the Aphidæ. The "man" still used by the Arabs for food is probably the manna of Exodus and is secreted by a coccus. White wax is secreted by a species in India, and another produces in China the wax commercially known as China wax. The shelly resinous scale produced by another form is the lac or shellac of commerce, while the body of the lac-producing insect affords the red dye known as lake. Other Asiatic and European species furnish dyes. The tropical American *Coccus cacti* yields cochineal (q.v.). Axin and axinic acid are produced by another Mexican coccus. Consult Newstead, *Monograph of the Coccidæ of the British Isles* (London, 1900), and the references to subdivisions of this group in Banks, "List of Works on North American Entomology," *Department of Agriculture, Bulletin 81* (Washington, 1910). See LAC INSECT; SCALE INSECT.

COCCID'IO'SIS. See DIARRHŒA, WHITE, OF CHICKENS.

COCCID'IUM. A protozoön of the order Sporozoa, occurring as a cell parasite in most animals. *Coccidium oviforme* has been found in human liver and intestines. Within a mosquito inoculated with malaria are found coccidia, which, rupturing, set free threadlike bodies eventually found in the secretion that lubricates the mosquito's lancet.

COCCIUS, kŏk'tsē-o͝os, ERNST ADOLF (1825–90). A German oculist, born near Leipzig. He studied medicine at the universities of Leipzig and Prague and practiced several years in Leipzig, where he became connected with the university in 1851. He was made full professor of medicine there in 1867. Coccius made contributions of great value to the diagnosis of the diseases of the eye. His published works include: *Ueber die Ernährungsweise der Hornhaut und die Serum führenden Gefasse des menschlichen Körpers* (1852); *Ueber die Anwendung des Augenspiegels nebst Angabe eines neuen Instruments* (Leipzig, 1853); *Ueber die Neubildung von Glashäuten im Auge* (1857); *Der Mechanismus der Akkommodation des menschlichen Auges nach Beobachtungen im Leben* (1867); *Ueber Augenverletzungen und ihre Behandlung* (1871); *Ophthalmometrie und Spannungsmessung am kranken Auge* (1872); *Ueber die Diagnose des Sehpurpurs im Leben* (1877).

COC'CO (West Indian name). EDDOES, YANTIA, or TANIERS, names given in the West Indies to species of *Xanthosoma*, of which there are about 30, all American. *Xanthosoma* is a genus belonging to the Araceæ, or aroids, and

only about three species are of economic importance, viz., *Xanthosoma sagittifolium*, *X. violaceum*, and *X. atrovirens*. Until quite recently these plants have been confused with the elephant ears, or taro (*Colocasia antiquorum*), and allied species of the Pacific islands. They resemble the taro, but may be distinguished by their leaves never being in the least peltate and by their producing numerous tubers. These tuberous offshoots often contain as much as 30 per cent starch and are used similarly to white or Irish potatoes. The leaves are often served as a potherb, resembling spinach. The culture of the plant is quite simple, and the yields are large, and it may prove adapted to the frostless portions of the United States. The taro is recognized by its slightly peltate leaves and its large fleshy rootstock. In Hawaii, and the South Sea Islands generally, taro is one of the staple sources of food for the natives. The rootstock is roasted, after which it is pounded in wooden trays with water into a thick dough. This is allowed to ferment and may be eaten in that state or prepared in a number of ways. Its native name in Hawaii is poi. In Japan, Porto Rico, etc., the rootstocks are utilized as we use potatoes.

COCCOSTEUS, kŏk-kŏs'tē-ŭs (Neo-Lat., from Gk. *κόκκος*, *kokkos*, berry + *ὀστέον*, *osteon*, bone). A genus of heavily armored fishes, of the order Arthrodira, fossil remains of which are found in the Devonian rocks of Europe and North America. The head and the forward part of the trunk were covered with strong bony plates, and the plates of these two regions articulated by a hinge joint that admitted of free movement of the head upon the trunk. The skull had large orbits, placed well forward, and in the middle of the frontal surface was a pit that indicated the position of the pineal body. The jaws were strong, and the mandibles or lower jaws were furnished with conical teeth. The trunk of *Coccosteus* was sharklike in form, and was provided with a single dorsal fin, an anal fin, and perhaps a pair of rudimentary pelvic fins. It was probably covered by a soft skin that readily decomposed after the death of the animal and that hence escaped fossilization. The vertebral column shows an interesting progressive stage in the evolution from the cartilaginous backbone of the earlier fish to the completely calcified skeleton of the later genera. The neural arches and the spiny processes of the vertebræ have alone become calcified, so that in well-preserved specimens they appear as two rows of bony processes, with an intervening empty canal that represents the cartilaginous centra, or "bodies," of the vertebral elements. All the species of the *Coccosteus* are small, none of them having been found with a length greater than 20 inches. The best-known species and the type of the genus is *Coccosteus decipiens*, which is common in the Old Red Sandstone of the Scottish Devonian. A few specimens, though none so perfect as the Scottish, have been found in the North American Devonian. See FISH; DIPNOI; LUNG FISH.

COC'CULUS IN'DICUS (Neo-Lat. *cocculus*, dim. of Lat. *coccum*, berry, and Lat. *indicus*, Indian). The name given to a very poisonous seed brought from the East Indies, which is used for various medicinal purposes, and illegally, it is said, for imparting a bitter flavor to malt liquors. It possesses acrid and intoxicating qualities. It is used in India for stupefying fish, that they may be taken by the hand. When the seeds, known as "fish berries," are thrown into a stream, any fish in the neighborhood are quickly stupefied. It contains a most poisonous principle, called "picrotoxin," while the pericarp contains another called "menispermin," equally poisonous. It is the seed of the *Anamirta paniculata*, a beautiful climbing plant, of the natural order Menispermaceæ. The action of picrotoxin, when taken internally in poisonous doses, resembles that of strychnine (see NUX VOMICA); the most noticeable symptoms being uneasiness, restlessness, and tetanic convulsions. The drug is used to destroy lice and the parasite of ringworm. It has been employed internally, in small doses, to check the night sweats of phthisis. Poisoning occasionally occurs from drinking the drug, as it is sometimes prepared as a domestic parasiticide—the bottle being filled with equal volumes of the berries and rum, and allowed to stand after shaking. Absorption through broken skin also causes poisoning at times. The genus *Anamirta* is closely allied to the genus *Cocculus* (see CALUMBA), in which it was formerly included. The fruit of several allied species possesses properties analogous to those of the *Anamirta paniculata*.

COCCYX, kŏk'sĭks. See SPINAL COLUMN.

COCHABAMBA, kō'chä-bäm'bä (*Cocha*, lake + *bamba*, plain). The capital of the Department of Cochabamba, Bolivia, situated on the Río de la Rocha, in a fertile valley, about 8000 feet above the sea level (Map: Bolivia, D 7). It is laid out with wide and regular streets and contains several pretentious structures, notably the theatre, government building, and the hospitals of Viedma and San Salvador. Cochabamba has a university, two colleges, and secondary schools. The city manufactures cotton and woolen goods, leather, soap, and earthenware, and besides carries on considerable trade, especially in grain. Pop., 1900, 21,881; 1910 (est.), 24,512. Cochabamba was founded in 1563 and was called Oropesa. In 1847 it was created an episcopal see.

COCHEM, kō'kĕm. The capital of a district in the Rhine Province, Prussia, at the confluence of the Moselle and Endert, 24 miles southwest of Coblenz (Map: Germany, B 3). It is noted for its picturesque situation, near the entrance to the Emperor William Railway Tunnel, 2⅔ miles in length, the longest in Germany. Cochem has a beautiful riverside park, in which is a war monument by Schies, and a former cloister of the Capuchins. The ancient episcopal castle of the archbishops of Treves, destroyed by the French in 1689 and restored since 1868, crowns a hill to the south of the town. Near by are the ruins of the castle of Winneburg. Its chief industries are milling, forestry, and the making and handling of wine. Pop., 1900, 3586; 1910, 3758.

COCHERY, kôsh'rē', GEORGES (CHARLES PAUL) (1855–). A French public official, son of Louis Adolphe Cochery, born in Paris. He was educated at the Lycée Condorcet and the Ecole Polytechnique. He was a director in the Department of Posts and Telegraphs, Minister of the Interior, President of the General Council of Loiret, and in 1895–98 and 1909–10 was Minister of Finance. He was made a chevalier in the Legion of Honor.

COCHERY, kôsh'rē', LOUIS ADOLPHE (1819–1900). A French statesman. He was born in

Paris, where he practiced law, and occupied the post of Chief of Cabinet in the Ministry of Justice during the revolution of 1848. He was subsequently editor of the *Avenir National*, and in 1868 established the journal entitled *L'Indépendant de Montargis*. As a member of the Left Centre in the Legislative Assembly, he opposed war with Germany, and after Sept. 4, 1870, acted as General Commissioner of the National Defense in the Department of Loiret. Under Dufaure he became Undersecretary of the Finances, and from 1878 to 1885 he was Minister of the Postal and Telegraphic service. He was elected to the Senate in 1888.

COCHIMI, kō-chē′mē. A name formerly applied to tribes of Yuman stock, occupying the northern and central portions of the peninsula of Lower California, Mexico. According to the account of the Jesuit Baegert, who labored among them for some years in the middle of the eighteenth century, they, like the Guaicuru and Pericu, who occupied the southern part of the peninsula, were in the lowest grade of culture, naked, without agriculture of any kind, and with no permanent shelters, depending entirely upon fishing, hunting, and wild fruits for subsistence. The dead were first buried, and after a certain time the remains were dug up, the bones cleaned and painted red, and preserved in ossuaries.

COCHIN, kō-chēn′ (Tamil *Kocchi-bandar*, 'Little Harbor'). The chief port of Malabar and the third in importance in the Madras Presidency, British India (Map: India, C 7). It is situated within the limits of the native State of Cochin in lat. 9° 58′ N. and long. 76° 14′ E. The town is about a mile long and half a mile broad, being at the northern end of a strip of land about 12 miles in length; it stands at one of the entrances of the Cochin backwater (see following article), which forms an excellent natural harbor of several square miles and provides communication by boat with a large area of rich country. The climate is very moist and hot; elephantiasis is common. Cochin is the only western port south of Bombay in which shipbuilding is carried on. It has a large trade, the main exports being coconut oil and coir; considerable tea from Travancore is exported. Of the import trade, more than half is rice. The Portuguese, under Cabral, arrived in 1500, and they soon got control of the town. Vasco da Gama founded a factory in 1502, and in 1503 Albuquerque built the Cochin fort, the first European fort built in India. Almeyda, arriving as Viceroy in 1505, enlarged the fort, and Cochin became the chief Portuguese settlement till the capture of Goa. St. Francis Xavier came in 1530 and made many converts; in 1577 the Society of Jesus published at Cochin the first book printed in India in native characters. An English settlement was made in 1634, when the East India Company by treaty acquired access to Portuguese ports. In 1663 the Dutch captured the fort and town, and the English retired to Ponnani. The town prospered under the Dutch, who remodeled it; in 1778 Van Moens rebuilt the fort. In 1795 the English besieged the town and captured it from the Dutch; the latter were allowed to retain their administration, but the cathedral (consecrated by the Portuguese in 1557), the fort, and many Dutch houses were blown up by the English in 1806, and in 1814 the town was definitely ceded to the East India Company. The population of Cochin in 1901 was 19,274; 1911, 20,023. More than half of the inhabitants were Christians, including a large Eurasian community.

COCHIN, kō-chēn′. A small native state of India in political relations with the government of Madras (Map: India, C 7). It consists of two disconnected parts, the larger of which is bounded on the north by the Malabar District of Madras, on the east by Malabar and Travancore State, on the south by Travancore, and on the west by Malabar and the Arabian Sea. The smaller part, called Chittur, lies to the northeast and is surrounded by the Madras districts of Malabar and Coimbatore. There are also a few small isolated tracts within Travancore. The total area is 1362 square miles. The eastern portion of the state, comprising nearly half the total area, is covered by a section of the Western Ghats, which reaches an altitude of about 5000 feet. It abounds in forests of teak and other valuable trees. To the west are forest-clad uplands, succeeded by plains reaching to a line of coastal backwaters. These backwaters or lagoons, which are separated from the sea by a long narrow stretch of sand densely grown with coconut palms, are very irregular in form, varying from a few dozen yards to four miles in breadth; they receive the numerous streams descending from the Ghats, communicate with the sea at three points, and are navigable for flat-bottomed boats. The climate is damp and enervating; the average annual rainfall is reported at 136 inches at Trichur, 108 at Ernakulam, and 66 at Tattamangalam; the temperature is fairly uniform, ranging from about 69° in December to about 96° in April, the mean being 82°. In the forests are found all the larger animals of southern India, and otters and crocodiles in the rivers and backwaters. Rice is the staple product, and coconuts second in importance; other crops are cereals and pulses, plantains and vegetables, betel leaf and areca nut, sugar cane, tapioca, ginger, pepper, and coffee. The forests, which cover nearly half the country, were formerly recklessly exploited, but now are conserved. The most important factory industry is the extraction of coconut oil. Coconut products constitute the principal exports. A branch line of railway, 65 miles long, was opened in 1902, connecting Ernakulam with Shoranur, on the southwest line of the Madras Railway. The backwaters form a line of communication from Trichur to the southern end of the state, 60 miles, and the canals branching therefrom aggregate about 60 miles. The capital is Ernakulam. The town of Cochin, which was formerly the capital and from which the state takes its name, has been British territory since 1814. The state is administered under a rajah, with the approval of the government of Madras. Pop., 1891, 722,906; 1901, 812,025 (increase 12.3 per cent); 1911, 918,110 (increase 13.1 per cent). Cochin leads all the districts and states of southern India in the literacy of its population, of whom over 13 per cent are able to read and write. Malayalam is the language of about 88 per cent of the people, and Tamil of about 7 per cent; in the Chittur taluk (285 square miles) over a third of the people speak Tamil. At the 1911 census Hindus numbered 615,710, Christians 233,092, Mohammedans 63,822, Animists 4177, Jews 1175, Jains 129, and Parsis 5. Of the Christians, 132,944 were Syrian and 97,987 Roman Catholic.

The Roman Catholic and the Syrian churches have a long history in Cochin, where there were probably Christians as early as the thirteenth century.

COCHIN, kō'chĭn (from *Cochin*-China). A breed of large domestic fowls, highly esteemed as producers of flesh and large eggs. They are known in black, buff, partridge (variegated), and white varieties, have yellow-feathered legs (except in the black variety) and single erect combs. See FOWL, and Colored Plate of DOMESTIC FOWLS in article POULTRY.

COCHIN, kō'shăN', CHARLES NICOLAS (1715–90). A French engraver and art critic, born in Paris. He was the most celebrated of a prominent family of engravers and painters and was the son and pupil of Charles Nicolas Cochin (1688–1754) and Louise Madeleine Hortemels, who was an etcher of note. He was named engraver to the King in 1739 and in this capacity designed a series of court subjects, such as "The Marriage of the Dauphin" (1745), in which his father assisted him. His drawings include vignettes, frontispieces, ornamental letters, and a number of portraits, including those of Garrick, Van Loo, Vernet, and Chardin. His works were catalogued by Jombert in 1770. Among them are etchings for his own pamphlets on Herculaneum and illustrations for the works of La Fontaine, Rousseau, Boccaccio, Ariosto, and Tasso. His criticisms on art were printed under the title *Œuvres diverses* (1757), and he also wrote *Voyage d'Italie* (1758), and *Mémoires inédites du Comte de Caylus*, published in 1880. He occupied many positions of distinction, and was ennobled in 1757. Consult Rocheblave, *Les Cochins* (Paris, 1893).

COCHIN, HENRY DENYS BENOIT MARIE (1854–). A French writer and legislator, born in Paris. He was educated at the Lycée Louis-le-Grand, Paris. In 1870–71 he served in the Franco-Prussian War, in 1877 he was an attaché of the Ministry of the Interior, and after 1893 he served continuously as a deputy. He was elected to the Academy in 1911. His publications include: *Giulietta et Romeo* (1878); *Le manuscrit de M. Larsonnier* (1880); *Boccace* (1890); *Un ami de Pétrarque* (1892); *Chronologie du Canzonière de Pétrarque* (1898); *Le frère de Pétrarque* (1903); *La vita nuova de Dante traduite et commentée* (1908); *Tableaux flamands* (1909); *Jubilis d'Italie* (1910); *Lamartine et la Flandre* (1912); *Ozanam: livre du centenaire* (1913); *Descartes* (1913).

CO'CHIN-CHI'NA, kō'chĭn-chī'nȧ. A possession of France, in the extreme south of the peninsula of Indo-China, lying between Cambodia and Annam on the north and the China Sea (Map: Asia, K 7). Its area is estimated at 21,980 square miles. It is traversed by the Mekong, which forms an extensive delta. The country is mainly a low plain, of alluvial origin. There is a region of granitic highlands in the northeast, representing the last spurs of the Annam chain, and reaching a height of 2300 feet. The Mekong, which has its source in Tibet, separates into three arms in Cochin-China, and together with many smaller rivers forms a network of waterways. The province in which Saigon, the capital, is located, is watered by the rivers Saigon, Donnai, and the two Vaicos. The delta land, almost wholly covered with rice fields and gardens, is frequently inundated, and the peninsula of Camau is like a great deserted swamp. Canals have been constructed for the joint purpose of commerce, irrigation, and drainage, vast areas thus being reclaimed for agriculture.

Cochin-China lies in the region of the monsoons. Typhoons frequently work great destruction. The healthfulness of the climate varies inversely with the frequency of the rains, and at its best is humid and warm. The severest heat is from April to June, and in the wet season there is almost a daily rainfall. Places near the seacoast are most favorable to Europeans. The flora is like that of Indo-China in general. The gamboge tree abounds, but palms are few. The vast forests are rich in the finest kinds of timber. There is game of every sort, from the elephant, rhinoceros, tiger, panther, leopard, deer, and wild boar, to the smallest rodents. Several species of venomous reptiles are found. Among the birds are the peacock, partridge, crane, duck, teal, snipe, woodcock, and pheasant. The rivers are plentifully supplied with fish of many species; alligators are numerous in the region of the Mekong. There is little mineral wealth, except phosphate of lime and salt. Most of the inhabitants are agriculturists and fishermen. About one-fourth of the area is cultivated, and the chief product is rice, which is planted throughout the country except in the north. Coffee culture is rapidly growing. Sugar cane, mulberry leaves, pepper, betel nuts, cotton, tobacco, maize, beans, sweet potatoes, oranges, bananas, and various valuable grasses, seeds, gums, and drugs are also produced. There are over 200,000 water buffaloes and 150,000 zebus employed in labor. Other farm animals are 11,200 horses, 109,000 cattle, 700,000 pigs, and 3000 sheep and goats. There are no native industries worthy of mention except the manufacture of salt, coarse silk stuffs, and sugar.

There are few good roads; but the innumerable little streams and canals give easy access to all parts of the country. The oldest railway in Cochin-China is that from Saigon to Mytho, now being extended from Mytho to Cantho, 60 miles. Other lines have been opened or are under construction and form part of the railway system of French Indo-China. In 1903 there were 2670 miles of telegraph. The chief article of commerce is rice. The minor exports consist of fish, cotton, copra, isinglass, silk, hides, and pepper. The articles imported are textiles, metals and metal implements, liquors, opium, paper, arms, and powder. In 1908, 756 vessels of 1,549,962 metric tons entered the ports of the colony. Commerce is mostly in the hands of Europeans and Chinese, but about 22,000 Annamites are small traders. There are over 73,500 fishing boats on the rivers and 3000 on the coast.

The colony is represented by a deputy in the French Parliament. It is divided into seven large provinces, Giadink, Vinh-long, Bassac, Bienhoa, Mytho, Chaudoc, and Hatien, which in turn are subdivided into 21 districts or inspectorates. The Lieutenant Governor, who is under the authority of the Governor-General of Indo-China, is assisted by a colonial council of 16 members, six of whom are French, and which has advisory functions, discusses and votes the budget, determines the taxes and the tariff. The Privy Council is a deliberative body of departmental heads as official members, together with two natives. Each province has its own administrative system, consisting of a provincial council and an administrator of native affairs. The provincial council is composed of natives and

discusses ways and means and questions of public works. The commune is the basis of the native social system, and the municipal councils are a sort of oligarchy of the prominent citizens. The cities of Saigon and Cholon are ruled by municipal councils part French and part native. Each important town has a citadel and garrison, and the collection of revenue and the suppression of robbery are secured by military posts in the interior.

The population in 1911 was placed at 3,050,785, of which 11,251 were Europeans, exclusive of the military. Saigon, the capital, had 64,845 inhabitants in the same year, of which 2939 were whites. Cholon had a population of 191,655. There were in 1911 about 380 schools, 800 teachers, and 19,000 pupils. Saigon presents a fine appearance, with its broad roads, good sanitation, and splendid government and public buildings, several of which cost over 2,000,000 francs. It has one of the finest docks in the world. A submarine cable connects it with Singapore and Hongkong.

For the administration of justice in Cochin-China there are native tribunals throughout the country, from which there is an appeal to the court at Saigon. In this appeal court European judges are assisted by Annamite mandarins in matters affecting the natives. In 1905 the penal system was reformed and punishment by torture abolished.

Cochin-China before the second half of the nineteenth century constituted a part of China, Cambodia, and Annam successively. In 1861 the French took Saigon and by treaty in the following year acquired the provinces of Saigon, Bienhoa, and Mitho. Hostilities continued until 1879. In 1888 the colony became a part of the Governor-Generalship of Indo-China. The name "Cochin-China" was formerly applied to the whole eastern division of the Indo-Chinese peninsula, including Tongking, Annam proper, and Lower Cochin-China. Consult: Lemire, *La Cochinchine française* (Paris, 1887); De Lanessan, *L'Indo-chine française* (ib., 1888); Norman, *Peoples and Politics of the Far East* (London, 1895); Baurac, *La Cochinchine et ses habitants* (Saigon, 1896–99).

COCHINEAL, kŏch'ĭ-nēl (from Sp. *cochinilla,* cochineal, wood louse, from Lat. *coccineus,* scarlet, from *coccum,* berry, or from Sp. *cochina,* sow; so called either from the color, or, if the second derivation be preferred, from the shape). A scale insect used as a dyestuff for scarlet and crimson and in the preparation of carmine and lakes. Cochineal consists of the bodies of the females of a coccid (see COCCIDÆ) called *Coccus cacti,* because it feeds upon plants of the cactus family, particularly on one known in Mexico as the nopal (*Opuntia cochinillifera*), nearly allied to the prickly pear. (See CACTUS.) These insects are minute, 70,000, it is said, being required to weigh a pound in a dried state—when not adulterated by red lead or other heavy dust. The male is of a deep-red color and has white wings. The female, which is wingless, is deep brown, covered with a white powder; flat beneath, convex above. Branches of nopal covered with insects are cut off before the rainy season sets in and carefully sheltered in a covered building. From these supplies the plantations are stocked at the close of the wet season, about the middle of October. When warmed by the sun, the females soon begin to lay eggs, each female producing more than 1000 young, which soon spread themselves over the plants. The males are very few—not more than 1 to 100 or 200 females—and are of no value as a dye. The first crop of females is picked off about the middle of December, and until May successive generations are gathered from time to time. The females, full of young, lose about two-thirds of their weight in drying. The process of gathering the insects is extremely tedious, a day's picking amounting only to about two ounces of cochineal. The killing is done in three ways: (1) by placing on a hot iron; (2) by placing in a hot oven; and (3) by dipping in a basket into boiling water, which is considered the best method. When killed and dried, they may be kept for any length of time without injury. The name "cochineal" is limited to that species first cultivated in Mexico, but long transplanted successfully to the Canary Islands, Java, and other warm parts of the Old World. Other species were known to the ancient Hebrews and Egyptians and were largely cultivated on a species of oak. Among the Arabs this insect is known as *kermes,* "red dye," and it is largely cultivated in Algeria (*Knowledge,* London, 1901). Cochineal was formerly much used for coloring wool or silk a scarlet or crimson; but, owing to the cost of its production and to the fact that the colors, although brilliant, are not very enduring, this dye has been greatly replaced by cheaper coal-tar products; and for this reason the cochineal industry has been rapidly declining. See CARMINE.

COCHITI. See Colored Plate of INDIANS (KERESAN STOCK).

COCHITUATE (cō-chĭt'ū-āt) **LAKE** (Massachusetts Indian: very deep water). A lake in Middlesex Co., Mass., 17 miles west of Boston. It is very narrow and irregular, with a length of about 4 miles, and has an area of little more than 1 square mile. From this lake and the connecting ponds, the city of Boston draws part of its supply of water (Map: Massachusetts, E 3).

COCHLEA, kŏk'lē-ȧ. See EAR.

COCHLEARIA, kŏk'lē-ā'rĭ-ȧ. See SCURVY GRASS.

COCHRAN, kŏk'ran, JOHN (1813–98). An American soldier and lawyer. He was born in Palatine, N. Y., graduated at Hamilton College in 1831, served as surveyor of the port of New York from 1853 to 1857, and from 1857 to 1861 was a Democratic member of Congress, where he took a prominent part in the debates on land reform, revenue, and other public questions. At the outbreak of the Civil War he became colonel of the First United States Chasseurs, which he commanded in the Peninsular campaign. In July, 1862, he was appointed brigadier general of volunteers, but resigned his commission in June, 1863, on account of failing health. He was Attorney-General of New York State in 1863–65. In 1864 he was nominated for the vice presidency on the ticket with John C. Frémont. As leader of the New York delegation to the Cincinnati Convention in 1872, he was instrumental in securing the nomination of Horace Greeley (q.v.) for the presidency. At the time of the Tweed-Ring disclosures in 1872 he became acting mayor of New York.

COCHRANE. A town in Timiskaming district, Ontario, Canada, situated on the National Transcontinental Railway and the Timis-

kaming and Northern Ontario Railway (of which it is the northern terminus), 500 miles north of Toronto, 550 miles west of Quebec, and 750 miles southeast of Winnipeg. It contains a customhouse and is the commercial centre for the newly opened northern Ontario and northern Quebec, especially the outfitting point for miners and prospectors, and for fishing and hunting parties. Machine shops and roundhouses of both the above-mentioned railways are located here. The town possesses electric-light and power, water works and sewage system. Pop., 1911, 1715.

COCHRANE, FRANCIS (1852–). A Canadian merchant and statesman. He was born at Clarenceville, Province of Quebec, and was educated at the Clarenceville Academy. A few years afterward he removed to Sudbury, Ontario, and engaged in mining and lumbering. Entering municipal politics, he became mayor of Sudbury for several terms, and in 1902 was an unsuccessful candidate for the Ontario Legislature in the Conservative interest. He was elected in 1905, and again in 1908, when he was appointed Minister of Lands and Mines in the cabinet of Sir James P. Whitney (q.v.). In 1909–12 he was a member of the Royal Conservation Commission. Upon the accession to power of the Dominion ministry of Robert Laird Borden, Cochrane was appointed Minister of Railways and Canals.

COCHRANE, kŏk'*ran*, THOMAS, tenth EARL OF DUNDONALD (1775–1860). A British admiral, familiarly known as Lord Cochrane. The son of the ninth Earl of Dundonald, he was born at Annsfield, Lanarkshire, Dec. 14, 1775. His father, a scientist, ruined himself by experimental invention, and the boy received a desultory education volunteered by the village minister and schoolmaster. He was destined for the army, but in his seventeenth year joined his uncle's ship, on which he had been enrolled five years previously, and, in consequence of this priority, received rapid promotion. After serving in the Norway fiords and on the North American station, he won recognition in 1801 by a successful series of daring exploits in the Mediterranean, the most brilliant being the capture of a Spanish frigate of 600 tons and 319 men, which had been sent in quest of his small brig of 158 tons and 54 men. Shortly afterward his vessels were captured by three French line-of-battle ships, after several hours' resistance, but he was himself immediately released on parole. In 1802 he took advantage of the peace to repair his defective early education by a six months' assiduous course at Edinburgh University. He had imprudently offended Lord St. Vincent by a comparison, and at the renewal of hostilities in 1803 he was maliciously appointed to the stagnant Orkney station to protect nonexistent fisheries. But with a change of admiralty in 1804 he received a new ship, and within ten days captured several prizes. By a daring ruse he cleverly evaded a squadron of French battleships and sailed his prizes into Plymouth harbor, three golden candlesticks, each 5 feet high, decorating his masthead as specimens of spoil. In 1807 he was elected to Parliament for Westminster, but his indiscriminate exposure of naval abuses led to his being immediately ordered off to the Mediterranean. During four years he added to his reputation by a sequence of minor naval exploits and in 1809 was selected to burn out the French fleet which Lord Gambier had blockaded in Aix Roads, near Rochefort. He drove almost the whole squadron ashore and destroyed four ships; but, as he was unsupported by his superior, Gambier, who deliberately ignored his signals, the victory was incomplete. Cochrane received the knighthood of the Bath, but he emphatically expressed his disgust at the incompetency of Gambier, who demanded a court-martial. Through influence and a friendly court Gambier was exonerated, while Cochrane, discredited, was forced to retire on half pay. In Parliament, Cochrane continued his unsparing criticism of naval corruption, and thereby he made enemies who tried to implicate him in an attempt to influence the stock market by spreading the rumor of Napoleon's death. His uncle and another were found guilty and punished; and Cochrane, although innocent, was fined £1000, struck off the navy list, expelled from Parliament, degraded from his knighthood, sentenced to a year's imprisonment and to stand for an hour in the pillory. Owing to popular indignation, the pillory punishment was omitted. His Westminster constituents remained his friends and reëlected him. He escaped from jail in 1815, took his seat in the House, but was expelled by force, imprisoned for the rest of his term, and fined anew £100. Disgusted with vain attempts at justification, he accepted an invitation to organize the Chilean navy, and in 1818 proceeded to Valparaiso. He put the wretched Chilean vessels into the best possible condition and gained a series of remarkable successes over the Spanish fleet. In 1820 he took Valdivia and carried San Martin's army to Peru, having previously destroyed Spanish commerce on the Pacific coast and performed a brilliant exploit in cutting out the Spanish frigate *Esmeralda* from under the enemy's guns at the castle of Callao. Nonfulfillment of contracts and the refusal of arrears of pay caused him to resign, and soon afterward he became admiral in the Brazilian navy. During this appointment (1823–25) he compelled the Portuguese to evacuate Bahia, reduced Maranhão, and for his services received the marquisate of Maranhão; but the same causes as in the Chilean service led to his resignation from the Brazilian. His next appointment was the command of the Greek navy (1827–28); but an insufficiency of ships and men prevented the accomplishment of anything of importance. In 1831 he succeeded to the Dundonald peerage; in the following year William IV satisfied a general wish by granting him a free pardon for the offense of which he had been convicted, and in 1847 Queen Victoria reinstated him in the Order of the Bath and to his naval rank. In 1877 his heirs received compensation for his unjust condemnation in a restoration of 18 years' loss of pay and allowances as a naval officer. From 1848 to 1851 he was commander in chief of the North American and West Indian stations and became rear admiral of the United Kingdom in 1854. To an advanced age he busied himself with scientific inventions for the navy and early recognized the advantage of steam power and of the application of the screw propeller to war ships. He published: *Notes on the Mineralogy, Government, and Condition of the British West India Islands* (1851); *Narrative of Services in the Liberation of Chile, Peru, and Brazil*

(1859); and an *Autobiography* (2 vols., 2d ed., 1860); the same completed by the eleventh Earl and H. R. Fox Bourne (2 vols., London, 1869). He died at Kensington and was buried in Westminster Abbey. Consult: Fortescue, *Dundonald* (London, 1895); Atlay, *Trial of Lord Cochrane before Lord Ellenborough* (London, 1897); Miranda, *Memorias de Lord Cochrane* (Santiago de Chile, 1905).

COCINERO, kō'sē-nā'rō (Sp., cook). The name of various species of West Indian crévalle (q.v.).

COCK, THE. A primitive tavern or alehouse on Fleet Street, near Temple Bar, London, with decorations of the period of James I. It is a famous resort and is well known through Tennyson's "Will Waterproof's Lyrical Monologue." The same name was borne by several other London taverns, of which one on Threadneedle Street was especially renowned.

COCKADE' (Fr. *cocarde* or *coquarde,* from *coq,* cock). A word first found in the works of Rabelais, "*bonnet à la coquarde,*" and in the early part of the seventeenth century used to designate a cocked hat or cap set jauntily on the head. Later on, however, it acquired a more restricted meaning and was applied to the clasp or knot of ribbon which decorated the loop or cock of the hat. The word is now employed to designate a rosette or knot of ribbon, leather, or other material worn on the hat as a badge or ornament. Cockades have always been used as party badges and insignia since the War of the Spanish Succession, when the red and white cockade was adopted by the French. In England the Stuart cockade was white, the Hanoverian was black, and frequent references to the rival colors are to be met with in the literature of the time. As early as 1767 a regulation in France provided that every French soldier should "mount the cockade," the color being white; and a later decree, in 1782, restricted the wearing of cockades to the military. From this period till the outbreak of the French Revolution the cockade was an exclusively military emblem, and "to mount the cockade" was synonymous with becoming a soldier, both in France and England. After the meeting of the States-General of France in 1789, cockades of green were worn by the advanced party, but these soon gave way to the more popular red, white, and blue—the tricolor of the Revolution. See TRICOLOR.

Every nation of Europe has its own cockade. In Germany, black, yellow, and white, and black, red, and gold have been used; in Austria, black and yellow; in Russia, green and white. In England the cockades worn are always black—the old Hanoverian color; but being used, generally, as part of the livery of coachmen and footmen, they have lost all special significance. Consult Carter, "Cockades: Their History and Significance," in *Genealogical Magazine,* vol. iii (London, 1899), and Racinet, *Le costume historique* (6 vols., Paris, 1888).

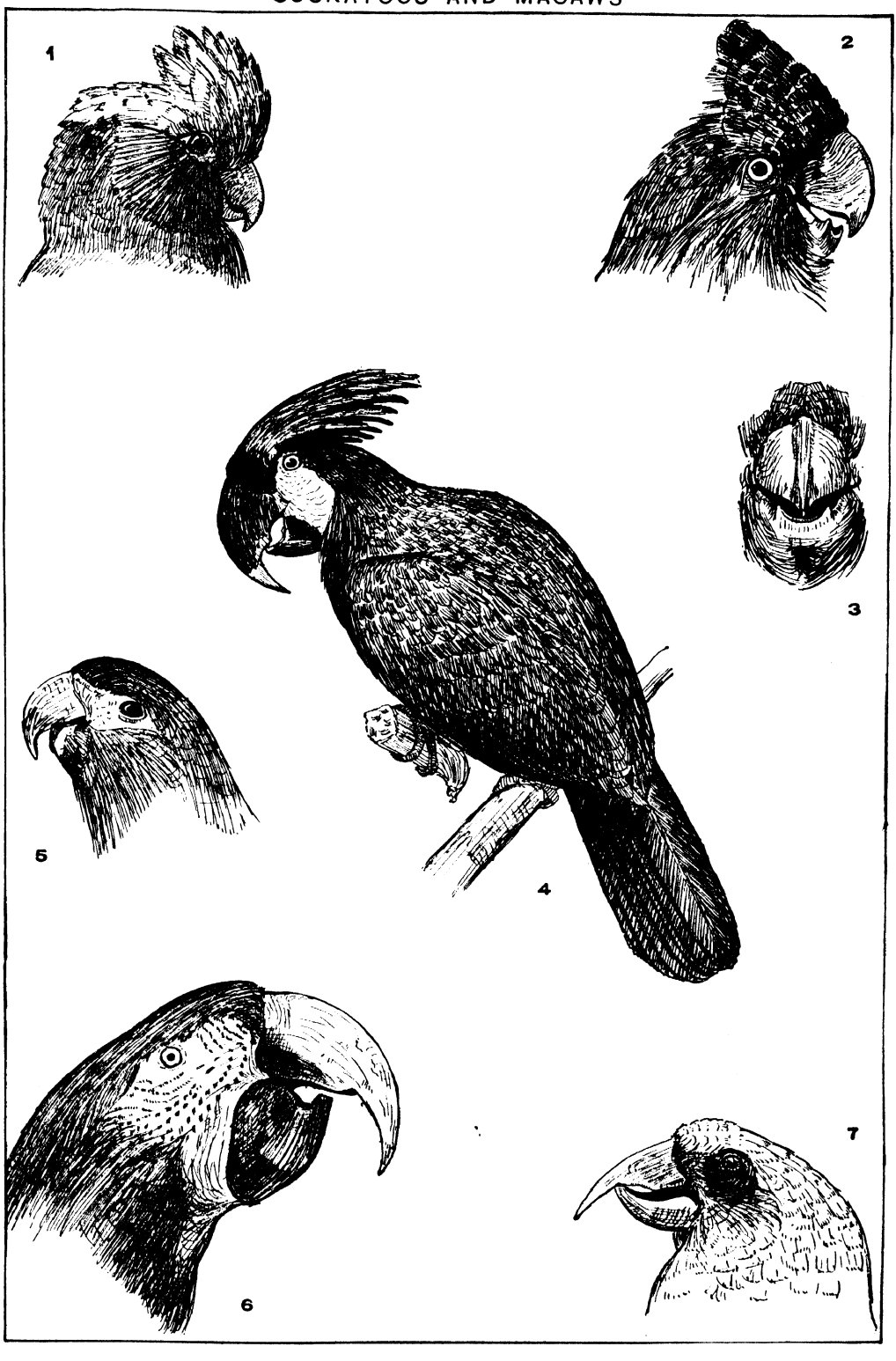
COCKAIGNE, kŏk-ān'. A name given to an imaginary land of good things—of idleness, luxury, and perfect happiness. The word appears in a variety of spellings in English and French, and means the "land of abundance." In it the rivers flowed with wine, the houses were built of dainties, and cooked fowls offered themselves for eating. Its English synonym is "lubberland." It is the subject of a popular satirical poem of the thirteenth century, *The Land of Cockaigne,* and is a burlesque term applied to London and to Paris.

COCK AND THE FOX, THE. A modernized version of Chaucer's *Nun's Priest's Tale,* made by John Dryden and published, with other translations, under the title of *Fables,* in 1699, shortly before his death.

COCK'ATEEL (from Dutch *kakatielje,* from Portug. *cacatilho, cacatelho,* cockatoo). A small, long-tailed Australian parrot of the genus *Calopsitta,* and the sole representative of the subfamily Calopsittacinæ. It is sometimes called "cockatoo parrakeet," or "ground parrakeet," its technical name being *Calopsittacus novæ-hollandiæ.* This pretty species is found wild over nearly the whole of Australia, where it goes about in flocks, sometimes of many hundreds, and nests in hollow trees. It is about 12 inches long, half of which belongs to the tail, which ends in two prolonged and sharply pointed feathers. The male is dark gray, with the face, cheeks, and crest bright yellow, and the ear coverts of a brick red. The wings have a wide band of white. The female is paler, and the face is only tinged with yellow. It is a favorite cage bird and thrives with but little care. If given a cage about 3 feet square and a hollow log, they are easily induced to nest, rearing 4 or 5 young at a time. A pair has been known to rear 16 young between March and September. The best food is a mixture of hemp, oats, and canary seed, with green food and fresh water. When young are in the nest, stale bread soaked in water should be provided. Consult Gould, *Birds of Australia* (London, 1865), and Seth-Smith, *Parrakeets* (London, 1903). See COCKATOO, and Plate of PARROTS AND PARRAKEETS.

COCK'ATOO' (Hind. *kākātūa,* Malay *kakatūa,* onomatopoetic from its cry). A bird of the family Cacatuidæ, of the order Psittaci (q.v.). They are closely related to the true parrots, and by some ornithologists are regarded as merely a subdivision of that family. The bill is high and curved from the base, and the tail is long, broad, and rounded. The head is also large, and in the true cockatoos is surmounted by a crest of long and pointed feathers, with their tips directed forward, which can be erected and expanded like a fan or depressed at the pleasure of the bird. The true cockatoos (*Cacatua*) are generally whitish in color, often finely tinged with red, orange, or other colors. The name "cockatoo," however, is also commonly extended to nearly allied genera, as *Calyptorhynchus* and *Microglossus,* in both of which the plumage is generally dark, and to which belong the black cockatoos of Australia and of the Indian Archipelago. The genus *Microglossus,* one of which is the great black cockatoo, or ara, of New Guinea (*Microglossus aterrimus*), the largest of all the Psittaci, is remarkable for the structure of its tongue, which is cylindrical, tubular, capable of being greatly protruded from the mouth, and terminates in a cloven, horny tip. All the cockatoos are natives of the Philippines, New Guinea, and adjacent islands, and especially of Australia and Tasmania, where they formerly abounded, and were hunted for food by the natives. They live on fruits and seeds, insect larvæ, etc. Some of them are frequently to be seen in confinement in Europe, particularly the lesser sulphur-crested cockatoo (*Cacatua galerita*), which, although of comparatively tame plumage, is a general favorite on account of its docility. None of the cockatoos learn to speak

COCKATOOS AND MACAWS



1. ROSEATE COCKATOO (Cacatuas roseicapillus).
2. WESTERN BLACK COCKATOO (Calyptorhynchus stellatus).
3. BILL OF No. 2—front view.
4. GREAT BLACK COCKATOO (Microglossus aterrimus).
5. BLUE-FRONTED MACAW (Ara nobilis).
6. GREEN-WINGED MACAW (Ara chloroptera).
7. SLENDER-BILLED COCKATOO (Licmetis nasica).

many words. Their name is derived from their cry. Compare PARROT and Colored Plate of PARROTS.

COCKBURN, kŏ'bûrn, SIR ALEXANDER JAMES EDMUND (1802–80), BARONET, Lord Chief Justice of England. Born Dec. 24, 1802, the son of Alexander Cockburn, who was at one time British Minister to Colombia, he was brought up on the Continent, and in 1822 entered at Trinity Hall, Cambridge, and was called to the bar in 1829. He was very successful as a practitioner and in 1841 was made a Queen's counsel. His early practice was largely in connection with election petitions, in which he won a wide reputation. In 1847 he was elected to Parliament as a Liberal from Southampton, and distinguished himself by the ardor and eloquence with which he supported the vigorous foreign policy of Palmerston. From this time on his promotion was rapid. In 1850 he was appointed Solicitor-General, and in the next year was promoted to the attorney-generalship. In 1854 he was made recorder of Bristol; in 1856 he was appointed Chief Justice of the Court of Common Pleas, and in June, 1859, he became Lord Chief Justice of England. In 1858 he succeeded to the baronetcy of his uncle, the dean of York. It fell to his lot, as a judge of the Queen's Bench, to conduct the trial of the celebrated Tichborne case (q.v.). His distinguished position as the head of the British bench was emphasized by his appointment in 1871 to represent Great Britain in the international court of arbitration convened for the settlement of the long-standing controversy between that country and the United States over the Alabama Claims (q.v.). For a sketch of his life, consult the *Law Magazine* for 1851, p. 193, and 4th series, vol. vi, p. 191; also *Law Times*, vol. xx, pp. 68–88.

COCKBURN, ALICIA, or ALISON RUTHERFORD (1713-94). A Scotch ballad writer. In 1731 she was married to Patrick Cockburn, of Ormiston, an advocate, and subsequently became acquainted with Burns, Hume, Lord Monboddo, and other celebrities of the day. Her lyric, "I've Seen the Smiling of Fortune Beguiling" (to the air of "The Flowers of the Forest"), has long been famous. She was one of the belles of Edinburgh, a graceful dancer, and an indefatigable letter writer. A relative of Walter Scott's mother, she all of her life sustained friendly relations with the poet and novelist. Consult her *Letters and Memorials*, with notes by T. C. Brown (London, 1900).

COCKBURN, CATHERINE (*née* TROTTER) (1679–1749). An English dramatist and philosophical writer. She wrote several plays, among which may be mentioned: *Agnes de Castro* (1696); *Fatal Friendship* (1698); *The Unhappy Penitent* (1701); *Love at a Loss* (1701). She is also known for her defense of the philosophy of Locke, and later for championing the views of Dr. Samuel Clarke. A collection of her prose works was published with a *Memoir* by Birch (London, 1751).

COCKBURN, SIR GEORGE (1772–1853). An English naval officer. His operations against Martinique brought about the surrender of that island in 1809. He was active in the war with the United States in 1812–15, planning and executing with General Ross the expeditions along the shores of Chesapeake Bay, and burning the public buildings in Washington. In the *Northumberland* he took Napoleon to St. Helena, where he remained in 1815–16 as Governor and commandant. He rose to the rank of admiral in 1837, was returned to Parliament in 1818, 1820, 1826, and 1841, and was one of the Lords of the Admiralty. William IV, when Prince of Wales and Lord High Admiral, quarreled with Cockburn over precedence, but was unsuccessful. Cockburn succeeded to the baronetcy in 1852.

COCKBURN, GEORGE RALPH RICHARDSON (1834–1912). A Canadian educator and member of Parliament. He was born in Edinburgh, Scotland, graduated at the university there in 1857, studied for several months in Germany and France, and in 1858 went to Canada, where in 1861 he became principal of Upper Canada College, which office he held for 20 years. From 1887 to 1896 he was a member of the Canadian Parliament. He was a stanch advocate of British Imperial federation. In 1893 he was chief commissioner from Canada to the World's Fair at Chicago.

COCKBURN, HENRY THOMAS, LORD (1779–1854). A Scottish advocate and judge. He was born in Edinburgh in 1779 and was educated at the high school of Edinburgh and afterward at Edinburgh University. He was called to the Scottish bar in 1800 and seven years later was appointed one of the advocates whose duty it was to assist the Lord Advocate in the prosecution of criminal offenders, but was dismissed after holding office four years. Not till the introduction of jury trial in civil causes into Scotland, in 1816, did Cockburn find opportunity for remunerative professional employment. His powers were better adapted for success with a popular than with a professional tribunal. Under the Grey ministry of 1830 he was appointed Solicitor-General for Scotland, and four years later he was made one of the judges of the Scottish supreme civil and criminal courts under the title of Lord Cockburn. He died April 26, 1854, at his residence of Bonaly, near Edinburgh.

Lord Cockburn contributed to the *Edinburgh Review* a series of articles on the reform of Scotch legal procedure, which had considerable influence. Late in life he undertook the task of writing the biography of Francis Jeffrey, the celebrated Scottish essayist and judge. This was published in 1852. Cockburn will be best remembered by the *Memorials of his Time*, which appeared posthumously in 1856. The work is an autobiography, into which have been interwoven anecdotes illustrating old Scottish life, and numerous sketches of the men who composed the brilliant circle of Edinburgh society at the beginning of the nineteenth century. For details of his life, consult also Chambers's *Biographical Dictionary of Eminent Scotsmen.*

COCKCHAFER. See CHAFER.

COCKER. A small dog. See SPANIEL.

COCK'ER, EDWARD (c.1631–75). An English engraver and teacher. He was born probably in Northamptonshire and died in London. The first edition of his famous arithmetic was published posthumously in 1678, by John Hawkins. At one time it was thought (following De Morgan's belief) that Hawkins wrote this work, but the evidence is against this view. Its popularity lasted nearly a century, and its sale probably exceeded 100 editions. The expression "according to Cocker" became proverbial through its frequent use on the title-pages of arithmetical treatises following his method. Cocker's chief works are: *Tutor to Arithmetic* (1664); *Compleat Arithmetician* (before 1669); *Arithmetic,*

edited by Hawkins (1678); and numerous contributions to methods of calligraphy.

COCKERELL, kŏk'ĕr-el, CHARLES ROBERT (1788–1863). An English architect, born in London. In 1810–17 he visited Greece, Italy, and Asia Minor to study ancient architectural remains, made excavations at Ægina and other places, and enriched the British Museum with many rare and valuable fragments, notably from the temples of Zeus Panhellenius (once so called, really of Aphaia) at Ægina and of Apollo Epicurius, near Phigaleia. He became surveyor of St. Paul's Cathedral in 1819, chief architect of the Bank of England in 1833, and a member of the Royal Academy in 1836. From 1840 to 1857 he was professor of architecture in the Royal Academy. He was the designer of many public buildings, such as the Hanover Chapel in London, and the Taylor Buildings at Oxford. His works include: *The Temple of Jupiter Olympius at Agrigentum* (1830); *Ancient Sculptures in Lincoln Cathedral* (1848); *Iconography of the West Front of Wells Cathedral* (1851); and *Travels in Southern Europe and the Levant* (1903), edited by his son.

COCKERELL, THEODORE DRU ALISON (1866–). An American zoölogist, born at Norwood, England. He was educated at the Middlesex Hospital Medical School, and studied botany in the field in Colorado in 1887–90. Between 1891 and 1901 he was curator of the public museum of Kingston, Jamaica, professor of entomology at the New Mexico Agricultural College, and entomologist of the New Mexico Agricultural Experiment Station. In 1900–03 he was an instructor in biology at the New Mexico Normal University; in 1903–04, curator of the Colorado College Museum; and in 1904 he became lecturer on entomology, and in 1906 professor of systematic zoölogy, at the University of Colorado. Cockerell is author of more than 2200 articles in scientific publications, especially on the Coccidæ, Hymenoptera, and Mollusca, and on paleontology and various phases of evolution. His later writings include: *Some Bees of the Genus Augochlora from West Indies* (1910); *The Scales of the Mormyrid Fishes* (1910); *Observations on Fish Scales* (1913); *Some Fossil Insects from Florissant, Colorado* (1913).

COCKERILL, kŏk'ĕr-il, JOHN (1790–1840). An English manufacturer, born at Haslingden. With his brother, Charles, he established in Berlin a successful woolen factory, and subsequently at Seraing, near Liége, Belgium, an iron foundry and machine shop, which became the largest on the Continent. King William I of the Netherlands was for a time a partner in this business.

COCK'ERMOUTH, -mŭth. A town of Cumberland, England, at the confluence of the Cocker and Derwent, 25 miles southwest of Carlisle (Map: England, C 2). It is situated in an agricultural district, and in the vicinity are extensive coal mines. On the left bank of the Cocker are the ruins of a castle built in the eleventh century and destroyed by the Parliamentarians in 1648. Near by is a tumulus, with a Roman camp and fort, where many ancient relics have been found. The town was the birthplace of the poet Wordsworth. It has woolen and flax mills and manufactures hats, paper, hosiery, leather, and machinery. Pop., 1901, 5355; 1911, 5203.

COCKFIGHTING. This is a sport of great antiquity, and to-day is the great pastime of millions, in the place of its origin, the Far Orient, as well as a favorite sport in many Western nations, including practically all Latin America. It is noted in the earliest records of China, it was a common pastime of the Persians long before the Greek invasion, it existed in ancient Rome, and Fitzstephen vouches for it in England in the twelfth century. Cockpits existed in the metropolis of England (as they did in New York) well into the nineteenth century.

The origin of the breed of gamecocks is lost in an obscurity as dim as that of the origin of the sport. The jungle cock of India may have been its progenitor; he has the constitutional instinct of fighting highly developed. The gamecock needs neither education nor experience to teach him to fight, and his capacity for giving and taking punishment till dead has passed into a proverb. During the latter half of the nineteenth century the sport of cockfighting was made illegal throughout Great Britain. In America it is similarly prohibited in nearly all the States of the Union, either expressly or by laws for the prevention of cruelty to animals. In a few Southern States, where it is not forbidden by the statutes of the State, it is in some instances made illegal by local laws. Generally it is considered a brutal and brutalizing performance.

For early history, consult: Markham, *The Pleasures of Princes, or Goodmen's Recreations* (London, 1614); Fairfax, *Complete Sportsman* (ib., 1764); Blain, *Rural Sports* (ib., 1853).

COCK LANE GHOST, THE. A supposed ghost, whose manifestations occurred in 1762 in Cock Lane, London, in connection with a young girl named Parsons and her parents. Investigation disclosed a conspiracy against a former resident, Mr. Kent, whose wife had died, and who was supposed to be accused by her ghost of murder. Parsons and his wife were punished. Among the investigators was Dr. Johnson, who described the mysterious occurrences in the *Gentleman's Magazine*, and who, because of his connection with the matter, was made the object of attack in Churchill's poem, "The Ghost." Consult Lang, *Cock Lane and Common Sense* (London, 1894).

COCKLE, kŏk'l (Fr. *coquille*, shell, from Gk. κογχύλιον, *konchylion*, dim. of κογχύλη, *konchylē*, from κόνχη, *konchē*, shell, Lat. *concha*, Skt. *śankha*, shell), *Lychnis.* A genus of plants of the family Caryophyllaceæ. The common cockle or corn cockle (*Agrostemma githago*) is a frequent weed among crops of grain, a native of Europe or the west of Asia, but now to be found in almost all parts of the world. (For illustration, see Plate of CRANBERRY.) It is an annual plant, clothed with long, white, appressed hairs; 3 feet high, branched, with large, solitary, terminal reddish-purple flowers. The root, stem, leaves, and seed were formerly used in medicine; the seed, which are poisonous, are still sometimes sold in Germany under the name of "black cumin" (falscher Schwartz-kümmel). The corn cockle is a very troublesome weed in some parts of Great Britain and the United States. The seed can hardly be screened from wheat, and in some localities millers reduce the grade of grain on account of the presence of cockle. Sowing clean seed is about the only means of combating it, aside from pulling the plants from the field. See LYCHNIS.

COCKLE. A globose marine bivalved mollusk, especially of the family Cardiidæ, often called "heart cockle" because, viewed endwise, the outline of the shell is like that of the ace of

hearts. Cockles are usually gregarious, and vast numbers are found half buried on sandy and muddy banks. The common European cockle (*Cardium edule*) is a valuable shellfish, extensively sold in Great Britain; other species are less commonly eaten elsewhere. The number of known species is great; they are most numerous within the tropics, and particularly in the Indian Ocean, where some have shells very beautiful in sculpture and coloring. The shell upon which Venus is represented, in ancient art, as riding upon the sea is a cockle; and several other genera, such as *Venus, Cytherea, Selene*, etc., are named in reference to this myth. Consult Lovell, *Edible Mollusks of Great Britain, etc.* (London, 1884); and see Colored Plate of CLAMS AND EDIBLE MUSSELS.

COCK'LEBUR', or CLOTBUR. A name given to the species of *Xanthium*, a genus of Compositæ, of which there are but few species, but these are widely distributed. Several species are all too common in the United States—*Xanthium spinosum* (called spiny clotbur) and *Xanthium strumarium*, both of which were probably introduced from the Old World, and the native species, *Xanthium canadense, Xanthium commune, Xanthium speciosum*, and *Xanthium echinatum*. (For illustration, see Plate of CORNFLOWER.) They are coarse, annual, branching plants, 1 to 3 feet high, with alternate, rough, heart-shaped leaves. The stem is frequently spotted with brown or purple. The flowers are in separate groups, the female ones furnishing the well-known burs, which are about an inch long and covered with stout, hooked prickles. These are troublesome to animals, especially to sheep, the wool of which is often seriously depreciated by their presence. The seeds contain two cells with an ovule in each. These retain their vitality for a long time, and both do not germinate in the same season. Being an annual, this weed can be exterminated if it be prevented from seeding for a number of years. In the south of Africa stringent laws for its eradication were enacted on account of the injury to the wool industry.

COCK'LOFT', PINDAR. The nom de plume used by Washington Irving in *Salmagundi*.

COCK'NEY. A word of disputed origin, used as a general term for a Londoner, more specifically for one "born within the sound of Bow Bells." It has been connected with cocagne, or cockaigne, and with the Thames, which is said to have been called "the Cockney."

The earliest form of the word is *cockenay*, i.e., 'cock's eggs,' a name given the inhabitants of towns on account of their ignorance of country ways and objects. It was not till the seventeenth century that the word began to be confined to the inhabitants of London. For a full historical explanation of the various uses of the word, consult Sir James Murray's *New English Dictionary*.

COCKNEY SCHOOL OF POETRY. A nickname which John Gibson Lockhart tried to fasten upon a school of writers, including Leigh Hunt, Keats, and Hazlitt, whom he thought vulgar. Their productions were said "to consist of the most incongruous ideas in the most uncouth language." Consult the articles "On the Cockney School," in *Blackwood's Magazine* (Edinburgh, October and November, 1817), where the expression was first used; also the article on Keats's "Endymion," in *Quarterly Review* (London, April, 1818).

COCK OF THE PLAINS. See GROUSE.

COCK OF THE ROCK (so called from building its nest on rocks). A remarkable bird of northern South America, representing a subfamily (Rupicolinæ) of the cotingas, three forms of which are known. The most familiar is *Rupicola rupicola*, or *crocea*, inhabiting the lower Amazon valley; it is about the size of a large pigeon, almost purely orange in plumage, and has a remarkable flat-sided crest. Two other species are found higher up the Amazon and in Ecuador. In each case the female is dull olive brown and uncrested. They inhabit rocky water courses and bushy hillsides, where they remain close to the ground and build their nests, largely of mud, on some rock. They are among the birds which court the females by assembling for "dances" in certain cleared spaces, each displaying its showy plumage by queer antics until chosen by some observant hen.

Great numbers of these splendid birds are shot annually, as their skins not only command a high price for millinery purposes, but are much employed by the Indians in making a variety of beautiful decorations, and they are thus becoming rare. A large state mantle, formerly worn by the Emperor of Brazil, was entirely composed of their feathers; and in some districts of South America, it is said, the natives are, or were, compelled to bring a certain supply of skins as tribute. Their flesh is well flavored, but of a very peculiar color, being bright orange red. The cock of the rock is much valued by residents of the Amazon valley as a cage bird, but does not thrive for any length of time when taken to foreign countries. Consult Hudson, *A Naturalist in the La Plata* (London, 1892). See Plate of COTINGAS.

COCK OF THE WOODS. See CAPERCAILLIE.

COCKPIT. In old sailing men-of-war the apartment in which the wounded were placed during the engagement. It was ordinarily below the water line on the orlop deck and served, under ordinary circumstances, as a broad passageway to the storerooms on each side of it. At one time the warrant officers were quartered in the forward cockpit, and occasionally other officers, for whom there was no room on the decks above, were quartered in staterooms opening from the after one, where storerooms were ordinarily placed.

COCKPIT, THE. A London theatre of the seventeenth century, changed from a cockpit, on Cockpit Alley, the present Pitt Place. It was succeeded by the Phœnix Theatre, which in turn was replaced by the Drury Lane Theatre.

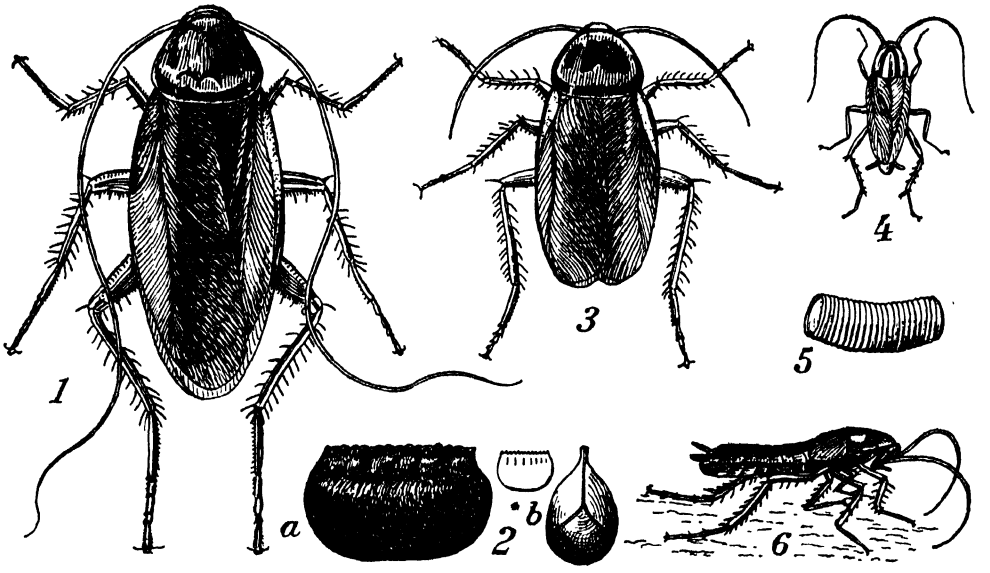
COCKRAN, kŏk'ran (WILLIAM), BOURKE (1854–). An American lawyer and politician. He was born in Ireland, was educated in that country and in France, shortly after his arrival in the United States, in 1871, was appointed teacher in a private academy, and subsequently became principal of a public school in Westchester Co., N. Y. He studied law at the same time and was admitted to the bar in 1876. He was elected to Congress in 1886 and again in 1890; opposed the nomination of Cleveland for the presidency in 1892; in 1896 supported McKinley; and in 1900 advocated the election of Bryan. He was again elected to Congress at a special election in February, 1904, to succeed George B. McClellan, and was reelected in November of the same year for the term of 1905–07.

COCK'RELL, FRANCIS MARION (1834–1915).

An American lawyer and politician, born in Johnson Co., Mo. He graduated at Chapel Hill College in 1853 and practiced law at Warrensburg, Mo. During the Civil War he served in the Confederate army, rising to the rank of brigadier general. He was a Democratic Senator from Missouri from 1875 to 1905. From the latter year until 1910 he was a member of the Interstate Commerce Commission, and in 1911 he was United States Commissioner to reëstablish the boundary between Texas and New Mexico.

COCK'ROACH, or ROACH. An orthopterous insect of the family Blattidæ, several species of which are household pests throughout the civilized world. Those most common are: 1. The Croton bug (*Ectobia germanica*), so called from its becoming noticeable in New York when Croton water was introduced, but really of foreign origin and of cosmopolitan range, having followed civilized man to all parts of the globe; it is of medium size, brown or yellowish, with wings, in the adult, extending beyond the abdomen. 2. The Oriental or proper cockroach (*Periplaneta orientalis*) is also a widely distributed pest introduced from the East. Although it is not at all related to the beetles (*Coleoptera*), its British name "black beetle" well describes its dark, shining, robust appearance; its wings are characteristically shorter than the abdomen. 3. The American cockroach (*Periplaneta americana*) probably originated in tropical America, whence it long ago spread to most of the seaport cities of the world; it is large and reddish brown, with very long wings. 4. The Australian cockroach (*Periplaneta australasiæ*), much like the American but smaller. In addition to these, which frequent houses, bakeries, warehouses, and shipping, there are a large number of wood cockroaches but rarely seen.

Roaches as a group prefer warm, moist places. They go abroad mainly at night and thus often escape notice even where they are abundant; and their excessively flattened body permits them to creep into very narrow crevices—below baseboards, in table drawers, etc., where the eggs ("nits") are laid, surrounded by a peculiar "pod"; but they are often carried by the female until nearly ready to hatch. The new-born young have nearly the same shape as the adult, but are wingless and pale in color. They are practically omnivorous, injuring all kinds of provisions, eating parts of books, blackened boots, and even the nails and eyelashes of sleeping children. The loss caused to provisions by their appetite is far surpassed by the remaining food being rendered unfit for human use, on account of the nauseous "roachy" odor noticed wherever they congregate in large numbers. Their only claim to credit is that they serve as scavengers to a small degree and are the enemies of bedbugs.



COCKROACHES INFESTING HOUSES.

1. The American cockroach (*Periplaneta americana*). 2. Egg capsule or "pod" of the same (somewhat enlarged); *a*, side view; *b*, end view; the dotted figure shows the natural size. 3. Australian roach (*Periplaneta australasiæ*); natural size. 4. Croton bug, or German roach (*Ectobia germanica*); natural size. 5. Its egg capsule; double size. 6. Oriental cockroach, or "black beetle" (*Periplaneta orientalis*); natural size.

Consult: for extended illustrated accounts of species above mentioned, Marlatt, *Household Insects* (Department of Agriculture, Washington, 1896; revised reprint, 1902); for general account of the Blattidæ, De Saussure, *Mélanges Orthoptérologiques*, fascicule ii (Geneva, 1878); for structure, Carpenter, *Insects: Their Structure and Life* (London, 1899).

Fossil Forms. During the latter part of the Paleozoic era cockroaches seem to have been very abundant, and to have formed the dominant feature of the insect life of that time. Their remains are present, though much less abundantly, in the Triassic rocks also, and some have been found in the Tertiary. The total number of fossil species is about 225, of which number 193 species are Paleozoic, and of these 133 are American. The Paleozoic cockroaches are as a rule larger, and have broader bodies than do the modern species. Their wings are quite common in the shales of the Coal Measures and Permian

at several localities, such as Richmond, Ohio; Cassville, W. Va.; Mazon Creek, Ill.; and Commentry, France. At a few localities the larval forms (nymphs) have been found and described under the generic name *Dipeltis*. The cockroach wings of the Coal Measures are usually found in shales that are replete with the leaves of ferns. One of the commonest ferns is Neuropteris, and the insect's wings so closely resemble the leaflets of this fern that the likeness has been remarked upon and explained as a case of protective mimicry, adopted by the insect to enable it to elude its pursuers by hiding among the fallen fern leaves.

For a full history of these insects, with recommendations for their suppression as a pest, consult: Howard and Marlatt, "Principal Household Insects of the United States," in *United States Department of Agriculture, Division of Entomology, Bulletin 4*, N.S. (Washington, 1896); also Miall and Denny, *The Structure and Life History of the Cockroach* (London, 1887); Marlatt, *Cockroaches*, publication of United States Department of Agriculture (Washington, 1908).

COCKS, Richard. A grocer and merchant adventurer of Coventry, England. He was one of the charter members of the East India Company (1600), merchant at Bayonne, France (1603–08), and one of the seven Englishmen who accompanied Capt. John Saris to Japan, on the first voyage of Englishmen thither. He established the British factory on the island of Hirado in 1613, and began June 1, 1615, to keep a journal, which is now of the greatest value as a contribution to the history of Japan and the foreigners there during the first quarter of the century, and as a picture of manners and customs. The *Diary* ends March 24, 1622. The great hope of the English was to open commerce with China, but they could not successfully compete with the Dutch, who understood them, and in the end starved them out of the country. In April, 1623, the dissolution of the English factory was decided upon, and Cocks and the other Englishmen arrived at Batavia, Jan. 27, 1624. Cocks made many travels through Japan, even to Yedo, meeting Iyeyasu and many native notables and the Korean Embassy. He introduced white potatoes into Japan from Java, and "Java potato" is still the name applied to this tuber by the Japanese. The diary of Richard Cocks, carefully edited and annotated by Edward Maunde Thompson, with introduction and index, was published in two handsome volumes by the Hakluyt Society (London, 1883).

COCKS'COMB' (from its crest, resembling the comb of a cock), *Celosia cristata*. An annual plant of the natural order Amarantaceæ, a native of the tropics, and formerly much grown in greenhouses and gardens. It grows with an upright stem, which becomes flattened upward, divides, expands, and forms a sort of wavy crest, covered with pointed bracts, and bearing on its surface many very small flowers. There are both tall and dwarf forms, and a number of colors of each. The plant is of easy cultivation. See Amaranth.

COCK'SFOOT GRASS. See Orchard Grass.

COCKSPUR GRASS. See Bur Grass.

COCKSPUR THORN. See Cratægus.

COCKSWAIN. See Coxswain.

COCK'TON, Henry (1807–53). An English humorous novelist, born in London. His works, of which *Valentine Vox, the Ventriloquist* (1840), is the best, were very successful in their day. *Stanley Thorne* was illustrated by so distinguished a trio as George Cruickshank, Alfred Crowquill, and John Leech. He also wrote *Sylvester Sound* (1844); *The Sisters* (1844); *The Love Match* (1847).

COCLES, kō'klēz, Horatius, "the one-eyed." A hero of ancient Rome. Aided by Lartius and Herminius, he defended the Sublician Bridge, on the Etruscan side, against a great army under Lars Porsena (q.v.), keeping the enemy at bay until the Romans behind them destroyed the bridge. When the bridge was about to fall, Cocles sent his two companions back; when it had fallen, sheathing his sword and praying the river to favor him, he plunged in and swam safely to the Roman shore. He received for reward as much land as he could plow in a day, and a statue in the Comitium. Consult Macaulay, *Lays of Ancient Rome*.

COCOA, kō'kō. See Cacao.

COCOA, Brazilian. See Guarana.

COCOA BUTTER. A pure white solid fat, obtained from the seeds of *Theobroma cacao*, in the process of working them up into cacao, having a specific gravity of .96 to .97 at 15° C. It is used in cosmetics and other pharmaceutical preparations, and in the manufacture of confectionery. Substitutes for cocoa butter are made from the solid fats obtained from palm-nut or coconut oils. See Cacao, Oils.

COCOANUT. See Coconut.

COCOA PLUM. An edible drupaceous fruit growing on a shrub (*Chrysobalanus icaco*) of the family Rosaceæ, in Florida and the West Indies. It is yellow, purple, or black, and is much like a large plum in appearance. The skin is thin, and the sweet white pulp adheres firmly to the stone.

COCOA ROOT. See Cocco.

COCOA-TREE CLUB, The. A London club, developed about the middle of the eighteenth century from the Tory Cocoa-Tree Chocolate House, which flourished during the reign of Queen Anne. It was a gathering place of Jacobites, and was frequented by many leading men of the day.

COCONU'CAN. A linguistic stock of South American Indians (its chief tribes are the Coconucos, Totoros, Moguex, and Guanacos), living on the west side of the central Cordillera, south of the Paniquitan, in the region of Popayan, in southern Columbia. Rivet attaches the Coconucan to the Chibchan stock. Several Coconucan tribes seemed to have participated before the Conquest in the more or less rude civilization of this part of South America. Consult Beaucleat and Rivet's *Affin. des langues du Sud de la Colombie, etc.* (Louvain, 1910).

CO'CONUT', or **CO'COANUT'** (Fr. *coco*, Gk. κοῦκι, *kouki*, cocoa tree, from anc. Egypt. *kuku*, cocoa tree). The well-known fruit of a species of palm (*Cocos nucifera*), perhaps originally a native of the Indian coasts and South Sea islands, although there is evidence of its prehistoric occurrence on the west coast of Central and South America. (For illustration, see Plate of Palms.) It is now diffused over all tropical regions. The coconut palm belongs to a genus having pinnate leaves, and staminate and pistillate flowers on the same tree, the latter flowers at the base of each spadix. There are about 35 known species, nearly all of which are natives of South America. Many of the species prefer dry and somewhat elevated districts. The

coconut palm, on the contrary, is seldom found at any considerable distance from the seacoast, except where it has been introduced by man, and generally succeeds best in sandy soil near the sea. It is always one of the first of the larger plants to establish itself in the low islands of the Pacific Ocean, as soon as there is soil enough. It has a cylindrical stem, about a foot in diameter, and from 60 to 100 feet high, with many rings marking the place of former leaves, and bearing at its summit a crown of from 16 to 20 leaves, which generally curve downward, and are from 12 to 20 feet in length, with numerous leaflets, 2 to 3 feet long. The flowers proceed from within a large pointed spathe; the fruit grows in short racemes, which bear, in favorable situations, from 5 to 15 nuts; and 10 or 12 of these racemes in different stages may be seen at once on a tree, about 80 or 100 nuts being its ordinary annual yield. The tree bears fruit in from 4 to 8 years from the time of planting, and continues productive for 70 or 80 years. Of the three round, black scars at one end of the shell, the largest one through which an opening is commonly made to get out the *milk* is the destined outlet of the germinating embryo, which is situated there, the kernel consisting generally of the endosperm destined for its nourishment. The thick husk is remarkably adapted to the preservation of the seed, while the nut is tossed about by the waves, until it reaches some shore far distant from that on which it grew.

The coconut affords to the inhabitants of many tropical coasts and islands a great part of their food; it is not only eaten as it comes from the tree, both ripe and unripe, being filled in a young state with a pleasant, milky fluid, but is also prepared in a variety of ways, as in curries, etc.

The kernel of the coconut contains more than 70 per cent of a fixed oil, called coconut oil, or coconut butter. The oil is itself an important article of commerce, being much employed for the manufacture of "stearin candles," and also of a "marine soap" which forms a lather with sea water. It is also employed as an article of food, so long as it remains free from rancidity—to which, however, it is very liable. It is obtained by pressure of the bruised kernel, or by boiling over a slow fire, and skimming off the oil as it floats on the surface. A quart, it is said, may be obtained from seven or eight coconuts. It is liquid at the ordinary temperature of tropical countries, but in colder climates becomes a white, solid, butter-like oil. It becomes liquid about 74° F. It can be separated by compression into a liquid portion called "olein," and a more solid part termed "stearin," or "cocosin," which is of complex constitution. The cake resulting from the pressure of the endosperm for its oil is an important cattle food. The dried kernel, known as copra, forms an important article of export from the South Sea islands, etc.

The root of the coconut palm possesses narcotic properties, and is sometimes chewed instead of the areca nut. When the stem is young, its central part is sweet and edible; but when old, this is a mass of hard fibre. The terminal bud (palm cabbage) is esteemed a delicacy, and trees are often cut down for the sake of it. The saccharine sap of the flower spathes before they open is a source of toddy and palm wine, and by distillation the liquor arrack. In the East Indies the juice is often boiled down to yield sugar (jaggery).

The dried leaves of the coconut palm are much used for thatch, and for many other purposes, as the making of mats, screens, baskets, etc., by plaiting the leaflets. The midribs of the leaves supply the natives of tropical coasts with oars. The wood of the lower part of the stem is very hard, takes a beautiful polish, and is employed for a great variety of purposes under the name of porcupine wood. The fibrous centre of old stems is made into cordage. By far the most important fibrous product of the coconut tree is coir (q.v.), the fibre of the husk of the somewhat immature nut. If the nuts are allowed to ripen, the coir is coarser and more brittle. The husk of the ripe nut is used for fuel, and also, when cut across, for polishing furniture, scrubbing floors, etc. The shell of the coconut is made into cups, goblets, ladles, etc., and is often finely polished and elaborately ornamented by carving.

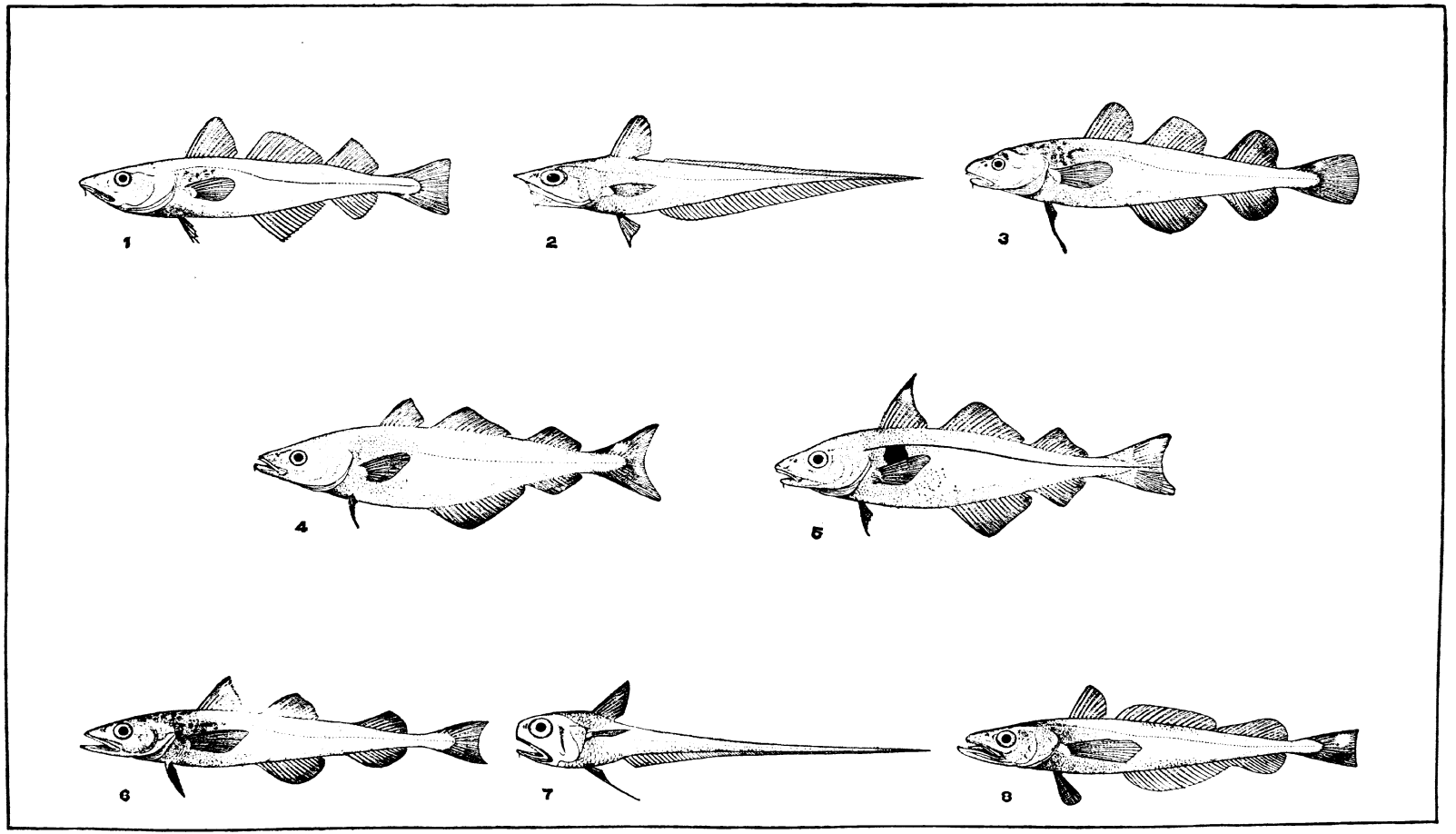
Cocos butyracca, one of the South American species of this genus, is a very large tree, and its nut abounds in an oil and butter of similar quality to that obtained from the coconut. The double coconut of the Seychelles Islands is the fruit of a palm of a different genus (*Lodoicea callipyge*). *Cocos weddelliana* is the species most commonly cultivated in greenhouses and in the open as an ornamental. For illustration, see PALM.

COCONUT, or ROBBER, CRAB. A large terrestrial macrurous crab (*Birgus latro*), of the East Indies, which feeds on coconuts. Although allied to the hermit, it has the abdomen symmetrical and covered above, with a series of horny plates, so that it requires no borrowed shell or other artificial protection. It is found in the islands of the Indian and South Pacific oceans, and may reach a size larger than that of any other land crab, enabling it to handle the largest nuts; and Forbes says that "one of its pincer claws is developed into an organ of extraordinary power, capable, when the creature is enraged, of breaking a man's arm." Its flesh is edible. It digs and inhabits burrows and long tunnels, lined with fibres stripped from coconuts. In these it lurks during the day, going abroad, as a rule, only at night. It feeds mainly upon fallen coconuts, not gathering them from the trees, as has been asserted, although it often climbs into the palms. "To get at the contents of the nut, the crab first tears away the fibre overlying the three 'eyes,' and then hammers away with its claws at the latter until a hole is made, when it extracts the kernel by means of its smaller pincers." This crab has its gills so modified as to function as lungs. It occasionally visits the water, and periodically resorts to the sea to spawn, where the young pass through their developmental stages in the water like other crabs. Several species are known. Consult Darwin, *A Naturalist's Voyage* (London, 1860), and Forbes, *A Naturalist's Wanderings in the Eastern Archipelago* (New York, 1885). See Plate of CRABS.

COCOON' (from Fr. *cocon*, dim. of *coque*, shell, from Lat. *concha*, shell). The pupa case of an insect. See INSECT; BUTTERFLIES AND MOTHS: ANT.

COCO'PA. An agricultural tribe, of Yuman stock, formerly holding the country about the mouth of the Colorado River and the head of the Gulf of California, in Mexico, and sometimes

CODFISH AND ALLIES



1. CODFISH (Gadus callarias).
2. A PELAGIC GADOID (Cœlorhynchus carminatus).
3. TOMCOD (Microgadus tomcod).
4. POLLOCK (Pollachius carbonarius).
5. HADDOCK (Melanogrammus æglifinus).
6. ALASKAN POLLOCK (Theragra chalcogramma).
7. A MACRURID (Hymenocephalus cavernosus).
8. SILVER HAKE (Merluccius productus).

ranging northward into Arizona. They still number about 245, but are rapidly wasting away from contact with civilization. They are now confined to a reservation near the mouth of the Colorado.

CO'CO RIVER. See SEGOVIA.

COCOS ISLANDS. See KEELING ISLANDS.

COCX, GONZALES. See COQUES, GONZALES.

COCY'TUS (Lat., from Gk. Κωκυτός, *Kōkytos*, river of wailing, from κωκύειν, *kōkyein*, to wail). A tributary of the Acheron in Epirus, now called Βωβός, *Bōbos* (Vuvo). Cocytus was also the name of a river of the infernal regions.

COD (origin obscure; possibly from *cod*, shell, husk, or from Flem. *kodde*, club, from the rounded shape of the fish). A fish (*Gadus callarias*) of the family Gadidæ, which almost rivals the herring in its importance to mankind. The body is elongate, slightly compressed, and tapers towards the tail, so that with the rather large head it appears heavy anteriorly. The body is covered with small scales. There are three dorsal and two anal fins. From the end of the lower jaw hangs a well-developed barbel. The general color varies greatly, being greenish, brownish, or even yellowish and reddish. The back and sides have numerous round, reddish-brown spots. The fins are dark. It will attain a weight of four to five pounds in about three years, and may ultimately reach a weight of 150 to 200 pounds, but the usual weight of large specimens is from 15 to 30 pounds.

The home of this fish is in the shallower parts of northern seas. "The southern limit of the species," on the American side of the Atlantic, according to Goode, "may safely be considered to be Cape Hatteras, in lat. 35° 10′. Along the coast of the Middle States, New England, and British North America, and upon all the offshore banks of this region, cod are usually found in great abundance during part of the year at least, . . . and it is more than probable that they occur in the waters of the Arctic Sea to the north of the American continent." It no doubt extends around the northern shore of the continent to Bering Strait, and thence into the North Pacific, for the cod of the coastal waters and shallows off Alaska, Siberia, and thence down to Vancouver Island and Japan are the same in appearance and habits, and probably specifically identical. On the European side of the Atlantic it frequents the Scandinavian and Spitzbergen coasts, the North Sea, and the waters about Great Britain and Iceland. Its favorite haunts are the ocean banks, down to about 120 fathoms, but it frequently approaches close to the coast, enters bays, and ascends the estuaries of large rivers. It is a powerful swimmer, predatory, having strong teeth upon the vomer, and is one of the most voracious denizens of the sea. It eats anything and everything it can, capturing other fishes, squids, etc., in large numbers, and devouring great quantities of deep-sea clams, which it swallows whole. The stomachs of cods have supplied to conchologists great numbers of rare shells, and before the days of deep dredging many conchological specimens were obtainable only in this way.

These fish are very prolific, 9,000,000 eggs having been taken from a single female weighing 75 pounds. The spawning season lasts from October to April, but the eggs of any given female do not all ripen at once. "Impelled by the spawning instinct, the cods seek the shoal waters of the coast or banks in shoals consisting of both sexes." Here the eggs are extruded, float to the surface, and toss about until they hatch, and the fry escape to become the prey of innumerable foes. It appears, however, that many (some say most) cod void their eggs in deep water, whence they rise and drift towards the shore. The destruction of eggs and young through various agencies must be very large; since, in spite of the enormous numbers produced, comparatively few reach maturity, so that the number of cod is limited, and liable to be materially reduced by persistent fishing. This diminution began to be felt, in fact, long ago, the cod almost disappearing from easily accessible inshore resorts, so that the fishermen have been obliged to go to the more distant oceanic banks. To compensate for this loss, the species has long been extensively propagated, both in Europe and America, more than 100,000,000 fry having been hatched and planted during the year 1897 alone by the United States Fish Commission. For the methods and results of these efforts, see FISH CULTURE; for the methods, extent, and value of the products of cod fishing, see FISHERIES; and for portraits of imported species, see Plate of CODFISH AND ALLIES.

Several other species, important as food, belong to this family, such as tomcod, haddock, ling, etc., which are elsewhere described. The "codfish" of the San Francisco markets, however, is an entirely different fish, a chirid (*Ophiodon elongatus*), for which see CULTUS COD.

For the most complete history of the cod family, consult G. Browne Goode, in *Fisheries and Fishery Industries of the United States*, Tenth Census (Washington, 1884), in which other books are mentioned; also Kendall, *Notes on the Food of Four Species of the Cod Family*, United States Fisheries Bureau (Washington, 1897); Smith, *Notes on the Tagging of Four Thousand Cod* (Washington, 1902); Bowers, *Artificial Propagation of Marine Species* (Washington, 1904); Bitting, *Preparation of the Cod and Other Salt Fish for the Market*, Government Publication (Washington, 1911). See COD-LIVER OIL.

COD, CAPE. See CAPE COD.

CO'DA (It., tail, end). The concluding passage of a musical composition. Originally a single phrase for ending a canon, it was used by the classical masters for the purpose of securing an effective close. Beethoven was the first to recognize the unlimited possibilities of the coda for the purpose of building up tremendous climaxes, thus raising it to the place of an essential factor in his architectonic scheme —a place which it has subsequently maintained in the works of later masters.

CODAZZI, kō-dät'sē, AGOSTINO (1792–1859). An Italian traveler, engineer, and geographer, born at Lugo, near Ferrara. He entered the army as a volunteer, and afterward set up as a merchant at Constantinople, whence he made extensive journeys through Europe. In 1817 he went to the United States. He served in the Venezuelan Revolutionary army, and later entered the Colombian service, in which he rose in 1826 to be a lieutenant colonel. From 1831 to 1838 he prepared maps of the State of Venezuela, being compelled, for the purpose of topographical surveys, to explore the deserts of Guiana, and to penetrate nearly to the sources of the Orinoco. The results of this undertaking

he published in Paris in 1841, under the title *Resumen de la geografía de Venezuela* (with an atlas). He subsequently made surveys of the Isthmus of Panama, with reference to the possibility of an interoceanic ship canal.

CODDE, kŏd'de, PIETER (c.1598–1678). A Dutch genre painter, born in Amsterdam. He is reputed to have been a pupil of Frans Hals, and was chosen to complete the latter's picture of the "Marksmen's Guild" in Amsterdam. He painted a few historical compositions, but most of his subjects are guardroom scenes, like those at The Hague and Dresden, or groups of people drinking, singing, and dancing, as "The Ball" (1633, Vienna), "The Dinner Party" (Emden), and others in Brussels, Berlin, Dresden, and Schwerin. His execution is spirited, his color finely shaded and of a silvery or golden-brown tone, and his treatment of costume is especially good. It is only recently that his works have been clearly identified and their value understood.

COD'DINGTON, WILLIAM (1601–78). One of the founders, and the first Governor, of the Colony of Rhode Island. He was born in Boston, Lincolnshire, England; came to Plymouth Colony in 1630 with a commission as magistrate, landed at Salem, and was for some time a trader in Boston. He undertook the defense of Anne Hutchinson, and opposed similar persecution in other cases, but without success. In 1638, with 18 others, he removed to the island of Aquidneck (later Rhode Island), and founded a colony which was to be "judged and guided by the laws of Christ." Coddington was elected Governor in 1640, and held the office until the Colony was incorporated in the charter with Providence Plantations in 1647. He went to England in 1649, and two years later obtained a commission to govern Aquidneck and Conanicut for life. His opponents in the Colony, through Roger Williams and John Clark, succeeded in having this revoked (1652); but Coddington did not finally submit until 1655. He became a Quaker in 1666, and from 1674 until his death was again in office as Governor. He left a work entitled *Demonstration of True Love unto the Rulers of Massachusetts* (1674). Consult "William Coddington in Rhode Island Colonial Affairs," No. 4 of the *Rhode Island Historical Tracts* (Providence, 1878).

CODE (from Lat. *caudex* or *codex*, trunk of a tree, tablet for writing). The word *code* is often loosely employed to describe: 1. A set of rules of any sort, as when we speak of the moral code or of the code of honor. 2. Any compilation of legal rules, from a collection of early customs like the Twelve Tables of Ancient Rome down to the building laws of a modern municipality.

As a modern legal term, the word *code* (Fr. *code*, It. *codice*, Sp. *código*, Ger. *Gesetzbuch*) may be defined as an orderly presentation, in statutory form, of some distinct branch or fairly extensive portion of the law. On the continent of Europe and in Latin America there are regularly in each State (1) a civil code, setting forth the law of persons, domestic relations, property, obligations, and succession; (2) a commercial code; (3) a penal, or criminal, code; (4) a code of civil procedure; and (5) a code of criminal procedure. Systematic arrangements of other and less extensive portions of the law, resembling the English Consolidation Acts, are sometimes termed codes, but more commonly laws. For European and Latin-American civil codes, see paragraph VIII of the subtitle *History*, in the article CIVIL LAW.

In Great Britain, the statutes of the realm have been revised by eliminating obsolete and repealed enactments (Revised Statutes, 1870, 1885); and statutes relating to certain subjects have been brought together in consolidation acts, of which, perhaps, the most important are the statute law revision and civil procedure acts of 1881 and 1883; but the only important acts in which the statutory and common-law rules relating to a given subject have been combined, and which are therefore true codes, are: the Bills of Exchange Act (1882), the Partnership Act (1890), and the Sale of Goods Act (1893). In British India codification has been carried much further. Not only have the general and provincial statutes been revised, but there are codes of civil and criminal procedure (1859 and 1861, new codes 1882 and 1898), a penal code (1860), and acts nearly equivalent to codes governing contracts (1872), and transfers of property, easements, and trusts (1882). Ceylon and the Straits Settlements have adopted or adapted some of the Indian codes. Canada, New South Wales, Victoria, New Zealand, and Queensland have criminal codes.

In the United States the general or public statutes of the Federal government, and those of a great majority of the States, are periodically revised, and these revisions are sometimes called codes. When (as is usually the case) the revision is passed by the Legislature, it replaces the original acts. The Revised Statutes are grouped according to the subjects with which they deal, and the arrangement of subjects is sometimes systematic, but more often alphabetical. Under either arrangement these compilations ordinarily contain more or less complete codes of criminal law and procedure, and sometimes codes of civil procedure. Nearly one-fourth of the States have separate codes of procedure; a small number have separate penal codes. The Revised Statutes rarely include anything approaching a complete civil code, and only four States (California, Louisiana, North Dakota, and South Dakota) have separate codes of this character; for in most of the States the substantive private law, especially the law of personal property and of contracts, is still in the main common law, i.e., to be sought for in the reports of judicial decisions. In Louisiana, where the common law has never obtained, there has been a civil code since 1808; but no State has yet passed a civil code which completely supersedes the common law. The first attempt to combine common and statutory law in a civil code was made in Georgia in 1860, in connection with a general revision of the law; but this code was not meant to be a complete enactment of the common law. Iowa, Ohio, and Texas have gone further than most of the other States in embodying common-law rules in statute form, but not so far as Georgia. The nearest approach to a complete enactment of the common law is found in a civil code which was drafted in New York, but which was not adopted in that State. It was, however, substantially adopted in the Territory of Dakota, 1865, and in California, 1872; and many of its provisions have passed into the laws of Montana, Utah, and

Wyoming. This code, although frequently revised and extended in the States of its adoption, has not completely superseded the common law. Consult *Estate of Apple*, 66 Cal. 432.

The question of codification, in England and in the United States, is practically a question of the advisability of transforming common or judge-made law into statutory law. The conditions are different from those which have prevailed on the continent of Europe. There the earlier modern codifications were provincial; and they were made partly to protect existing customs against the Romanizing tendencies of the courts, and partly to substitute for the Roman laws civil and canon laws written in the vernacular. The great codes now in force in France, Italy, and Germany were constructed to replace the earlier local provincial and State codes and to establish uniform national law. The codification movement in Switzerland has substituted a general federal law for the local cantonal laws. (See CIVIL LAW, *History*, VIII.) In England the existing common law is national, and codification by act of Parliament will simply change its form and the mode of its future development. In the United States, the common law is both national and local, i.e., bounded by State lines. As each State has its own system of jurisprudence free from national control, the United States Congress cannot codify the common law for the States, and codification is therefore possible only in the form of State codes; and even if the State codes were uniform at the outset subsequent amendment and varying judicial interpretation would speedily diversify them. Codification in the United States accordingly means the creation of a diversity of laws similar to that which has made national codification necessary in Europe. An important movement towards uniformity of law in the United States is represented by the Negotiable Instruments Act, the Sale of Goods Act, and the Bills of Lading Act, drafted by comissioners from the several States and already enacted in a considerable number of States and Territories.

Bibliography. Bentham's works, especially his *View of a Complete Code of Law* (Edinburgh, 1843); Savigny, *The Vocation of our Age for Legislation and Jurisprudence* (1814; trans. by Hayward, London, 1831); Field, *Speeches, Arguments, and Miscellaneous Papers* (New York, 1884–90); Carter, *Proposed Codification of our Common Law* (ib., 1884); *Provinces of the Written and Unwritten Law* (ib., 1889); Dillon, *Our Legal Chaos* (ib.); F. J. Stimson and Munroe Smith, "Statute and Common Law," in *Political Science Quarterly*, vols. ii and iii (ib., 1888–89); Ilbert, *Legislative Methods and Forms* (London, 1901).

CODEINE (from Gk. *κώδεια, kōdeia*, a poppy-head), $C_{18}H_{21}NO_3$. One of the alkaloids found in opium, in which it exists in relatively small quantities. In chemical constitution it is closely allied to morphine, being a *morphine-methyl-ether*. Pure codeine may be obtained from opium by extracting the latter with water, adding a little marble to the aqueous solution, concentrating and then precipitating it with calcium chloride solution; the filtrate now obtained yields, on concentration, a mixture of morphine and codeine hydrochlorides, and when these are decomposed with ammonia, practically pure codeine hydrochloride remains in solution; the solution is evaporated, and the codeine hydrochloride that separates out is decomposed with caustic potash; finally, the free codeine produced is recrystallized from aqueous ether containing no alcohol. Its physiological action is similar to that of morphine, and it is used in medicine to diminish sensibility to pain; it is also sometimes prescribed in diabetes. Codeine is a white crystalline substance, sparingly soluble in water, freely soluble in alcohol, ether, chloroform, and other organic liquids. It may be readily identified by dissolving a small quantity in strong sulphuric acid and adding a trace of ferric chloride solution, which produces a blue coloration. The medicinal dose of codeine is from one-quarter to two grains.

CODE NAPOLÉON. Properly, the entire body of French law as contained in the so-called Five Codes promulgated between 1804 and 1810. In general usage, however, the term is restricted to the first of these, the code of civil or private law enacted in 1804 and still in force. The relation of this code to the general development of European law is indicated in CIVIL LAW, *History*, VIII. At the outbreak of the Revolution (1789) there was great diversity in the laws by which different parts of France were governed, and the establishment of a general or national code was one of the reforms urgently demanded. Such a code was promised in the constitution of 1791, and the Convention caused a code to be drafted in 1793; but this draft was rejected because it contained "no new and grand ideas, suitable to the regenerated France." It was not until the revolutionary storm had spent its force and Napoleon, as First Consul, had established a strong government that the work could be pushed through. In July, 1800, the task was intrusted to a commission consisting of the most eminent jurists in France, chief among them being Bigot-Préameneu, Malleville, Portalis, and Tronchet. These men completed their work in four months. After the proposed code had been approved by the principal courts of justice, it was discussed in the Council of State, where Napoleon displayed great interest in the work and made many shrewd suggestions, and it was then submitted, title by title, to the legislative body. Here it encountered opposition, because it was considered too conservative; and it was not passed until the legislature had been reformed into docility. The entire code was promulgated, March 21, 1804, as *Code civil des Français*. In 1807 the title was changed to Code Napoléon. These two designations have since prevailed alternately, according to the form of government. After the completion of the civil code, other codes were adopted, dealing with civil procedure, penal law, criminal procedure, and commerce.

The Code Napoléon introduced little new law. It was a compromise between the customary law of the northern provinces, which was substantially German, and the law of eastern and southern France, which was mainly Roman. It consists of three "books." The first deals with persons, including family relations. The second deals with rights in things, but does not include the law of pledge and mortgage. The third, entitled "Various modes of acquiring ownership," includes succession, by testament

and ab intestato; matrimonial property law; the law of liens and mortgages; and the rules regarding proscription.

The great merits of the code are simplicity (sometimes secured by superficiality) and clearness of statement. In spite of these merits, the code has aroused the usual amount of controversies, some of which are still unsettled, and has required no little judicial interpretation. To contemporary jurists it seemed fairly complete; but experience has revealed many "open places" which have been filled, in part by judicial decisions and in part by supplementary legislation. There has been also considerable legislative amendment.

The Code Napoléon, as a result of French conquests, was introduced before 1814 into many parts of central and southern Europe. In most instances independent national codes have since been substituted; but the Code Napoléon is still in force in Belgium, in Holland, in several Swiss cantons, and in Italy the newer codes are largely based upon the French. The same is true of the code of Louisiana, of that of Quebec, Canada, of most of the Central American and South American codes, and of the Spanish Code of 1889. The Code Napoléon is contained in Roger and Sorel, *Codes et lois usuelles* (15th ed., Paris, 1883). There are commentaries by Marcade and Pont, *Explication théorique et pratique du code civil* (Paris, 1874–94); Mourlon, *Répétitions écrites sur le Code Napoléon* (12th ed., Paris, 1885).

CO'DEX (Lat., trunk of a tree, tablet). The name "codex" seems to have been applied first to books that were made by laying sheets one on another, like tablets, in sets of three, four, or more. Each one of such sets, when folded and stitched together, constituted a book (*liber*) in the more technical sense. Any number of these "books" might be bound together in a large book or codex. In distinction from the codex, the volume or roll was made by pasting or stitching the separate sheets together edgewise, thus forming a long ribbon which had to be rolled in order to be easily handled.

The word is at present used almost exclusively for manuscript copies of the whole or parts of the Bible or of the Greek and Roman classics. Some of the most important of the former are noted in the article on the New Testament text. (See BIBLE.) About 200 A.D. the codex form began to supplant the roll form. The earlier codices appear to have been larger than the later ones. It was perhaps in imitation of the appearance of the open roll, with its several parallel columns of reading matter, that the early codices were written with three or even four columns on a page. Later it was more usual to write but two, and finally but one. Codices were of either paper or parchment—of various grades—the latter being always the more common. The oldest codices were written in uncial script—that is, in semicapitals; the letters being, as a rule, separate from each other. They are without word divisions, punctuation, breathings, or accents. The separate books have only the simplest titles. In the fifth and sixth centuries the text was broken up into large sections beginning with large capital letters, accents and breathings were introduced, the titles enlarged, and more or less of introductory matter added. Some slight attempts at decoration were also indulged in. Late uncial codices, from the seventh to the tenth century, were frequently elaborately decorated with the parchment colored purple and the text written in gold or silver letters, e.g., the Codex Rossanensis. In the monasteries of the Middle Ages decorated or illuminated manuscripts were manufactured in large numbers. In the tenth century the uncial hand gave way to the cursive or running hand. Codices so written are called minuscules, in distinction from the majuscules or uncials. For other particulars, see BIBLE; BOOK; PALEOGRAPHY; TEXTUAL CRITICISM.

Consult: F. H. A. Scrivener, *Introduction to the Textual Criticism of the New Testament* (London, 1894); Gregory, *Textkritik des neuen Testaments* (Leipzig, 1900); Birt, *Das antike Buchwesen* (Berlin, 1882); Wattenbach, *Palaographie* (Leipzig, 1877–78).

CODEX JUSTINIANEUS. See JUSTINIAN I.

CODEX THEODOSIANUS. See THEODOSIUS II.

CO'DIÆ'UM. See CROTON.

COD'ICIL (Lat. *codicillus*, little book or writing, dim. of *codex*, code). A supplement to a will, whereby anything omitted is added, or anything in the body of the will is revoked or explained or changed so as to provide for altered circumstances of the testator or beneficiaries. A codicil is authenticated or executed in the same manner as the will which it modifies and is considered a part thereof.

There may be as many codicils to a will as a testator cares to make, and where a provision in a codicil is inconsistent with a provision in a will, the provision in the codicil governs, as the purpose of making the codicil is to express the testator's latest wishes as to the disposition of his property after his death. By the Roman and early English law a codicil was an informal will, made without the appointment of executors, which was considered necessary in a valid will; but the term is no longer used in this sense. See WILL, and authorities there cited.

CODIFICATION. See CODE.

COD'LING. A squirrel hake (see HAKE), or some other species of the genus *Phycis*.

CODLING MOTH. A small tortricid moth (*Carpocapsa pomonella*), the most serious pest of the apple (q.v.). The females issue from their cocoons in the spring and lay their eggs in the early evening upon the upper sides of the leaves and occasionally upon the forming fruit. The eggs hatch in about 11 days, and the young larvæ penetrate the fruit usually by way of the calyx. In about 20 days they reach full growth, leave the fruit, crawl to a twig and thence down on the trunk of the tree, where they spin their cocoons and transform to pupæ. The moths issue in two weeks. The moth has a wing expanse of less than three-fourths of an inch. The general color is grayish brown with coppery metallic markings. It lays eggs for a second generation usually upon the fruit and hibernates in the cocoon. The best remedy consists in spraying with an arsenical mixture such as Paris green or arsenate of lead. Two sprayings in the early part of the season are advised—one a few days after the blossoms have fallen and the other two weeks later. If necessary, subsequent sprayings are made. The banding of the trees with bagging affords the larvæ convenient places for transforming. The bands are examined from time to time and the cocoons destroyed. Consult Simpson, "The Codling Moth," in *Bulletin United States*

Department of Agriculture, Division of Entomology, N. S. No. 4 (Washington, 1903).

COD-LIVER OIL (*Oleum morrhuæ*, or *Oleum jecoris aselli*). One of the most valuable therapeutic agents at the disposal of the medical practitioner. It is a pale yellow fixed oil, obtained from the livers of the cod (*Gadus callarias*) and of other related species of fish that are caught in the northern parts of the Atlantic Ocean. Cod-liver oil is a better food and is more readily absorbed than any other oil; its value as a food is due mainly to its being much more readily oxidized than other oils. The benefit derived from it in disease associated with loss of flesh cannot be overestimated. It is given in tuberculosis, in rickets, in tertiary syphilis, in chronic bronchitis, chronic eczema, in many nervous diseases, in general feebleness, etc. It should, however, be administered with some caution and in moderate quantities, larger doses being liable to cause sickness and diarrhœa. In those cases in which the oil is rejected by the stomach, it may be rubbed into the skin, through which it is readily and certainly absorbed; this treatment is, of course, disagreeable on account of the nauseating smell of the oil. The taste of the oil may be masked to some extent by taking it in coffee or in whisky, or by adding to a dose of the oil a few drops of ether and a drop of oil of peppermint. The taste is completely abolished by taking the oil in soft gelatin capsules now prepared by many manufacturing houses; after remaining in such capsules for some time, the oil turns rather dark, but does not seem to be thereby deteriorated. Cod-liver oil is often taken in the form of emulsions. An emulsion recommended by many medical men contains, besides cod-liver oil, the yolk of an egg, powdered tragacanth, elixir of saccharin, sodium bicarbonate, tincture of benzoin, oil of bitter almonds, chloroform, alcohol, and water. With malt extract, too, cod-liver oil makes an excellent emulsion. The common dose of the pure oil is from a dessertspoonful to a tablespoonful three times a day.

Manufacture. In preparing the oil for medicinal purposes, only perfectly healthy livers should be used, and the green-colored (or spotted), diseased livers rejected. In former times the oil was obtained as follows: The fishermen would stow away the livers in barrels, which were kept unopened till the end of the fishing season, i.e., from one to four months. During that time the livers would undergo putrefaction, their hepatic cells, containing the oil, would burst open, and the escaping brownish-yellow oil (called *pale oil*) would rise to the top of the barrels and be drawn off. The livers would then be allowed to undergo further putrefaction, and a quantity of dark-brown oil (called *light-brown oil*) would again be drawn off. Finally, by heating the disintegrated liver residues thus obtained above the boiling temperature of water, a last quantity of oil (called *brown oil*), though really black) would be obtained. This primitive method, a knowledge of the details of which would render the oil too repulsive to most patients to swallow, is still employed to some extent. By far the greater quantity of the oil, however, now reaching the market is prepared in a much cleaner way by the steam process first introduced by Möller in 1853. Instead of allowing the livers to undergo putrefactive decomposition, Möller obtained the oil by simply heating for about three hours the fresh livers, which were carefully selected, cleaned by washing with water, and separated from the gall bladders.

To avoid delay, the livers are often heated on board vessels, in wooden apparatus, steam being conducted directly into the mass of livers. Usually, however, the livers are heated in tinned sheet-iron vessels, either single or double walled. The single-walled apparatus is heated over large water baths; the double-walled by passing steam into the space inclosed between the interior and the exterior walls. In all these apparatus the temperature is about that of boiling water. An improvement recommended during recent years consists in heating the livers at a considerably lower temperature for a much shorter time, and as far as possible out of contact with the air; it is asserted that in this manner the oxidation of the oil may be almost completely prevented and that the oil would therefore not become rancid, nor acquire the disagreeable property of causing eructations.

Composition. Besides a large proportion of fats, cod-liver oil has been shown to contain (1) a peculiar principle called *gaduin* ($C_{35}H_{46}O_6$); (2) a crystalline substance called *morrhuol;* (3) traces of bromine and iodine; (4) biliary principles; and other substances. The brown oils contain also considerable quantities of ptomaines, which cannot but be injurious to health; bleaching brown oil by sunlight only masks the presence of such substances without destroying their injurious properties and should therefore not be resorted to. It is generally believed that the great benefit derived from cod-liver oil in tuberculosis is due to the specific action of some active principle that must be contained in the oil. It is probable, however, that the effect is due to nothing but the food value of the fatty constituents of the oil. These fats are commonly assumed to consist, like other natural fats, of the glycerides of oleic, palmitic, and stearic acids. Möller's chemist, P. M. Heyerdahl, states, on the contrary, that cod-liver oil contains a little palmitic, but no oleic or stearic acid; according to him it consists mainly of the glycerides of therapic and jecoleic acids ($C_{17}H_{26}O_2$ and $C_{19}H_{30}O_2$, respectively), two unsaturated organic acids which are not known to exist anywhere else in nature and to which the therapeutic action of cod-liver oil is due. The solid fat that is sometimes removed by freezing the oil is, according to Heyerdahl, also composed mainly of those glycerides; so that its removal appears to serve no purpose whatever. In view of the readiness with which the fats of cod-liver oil undergo oxidation, the oil should be kept out of contact with the air. Cod-liver oil is now prepared in Norway, the United States, Canada, Newfoundland, Great Britain, Iceland, and Russia. By far the greater proportion of the oil reaching the market comes from Lofoten and Romsdal in Norway.

CODMAN, Robert (1859–1915). An American Protestant Episcopal bishop. He graduated from Harvard (A.B., 1882; LL.B., 1885), practiced law in Boston until 1891, and then studied theology for three years. In 1893 he was ordained deacon and in 1894 priest; for five years he was rector of St. John's, Roxbury, Boston, at the end of that period (1900) being con-

secrated Bishop of Maine. He received the degree of D.D. from a Canadian college and that of S.T.D. from Trinity College, Hartford.

CODOGNO, kō-dō'nyō. A city in the Province of Milan, north Italy, 30 miles east of Pavia (Map: Italy, D 2). Its parochial church has a beautiful portal of the sixteenth century. It is the principal export market for Parmesan cheese and has tanneries and linen, silk, and majolica factories. Pop. (commune), 1881, 11,444; 1901, 11,594; 1911, 11,208.

COD'RINGTON, SIR EDWARD (1770–1851). A British admiral, born in Gloucestershire. He entered the navy in 1783 and at Trafalgar (Oct. 21, 1805) was captain of the *Orion*. He afterward served in the Mediterranean and in North America, notably in the Chesapeake and at New Orleans, and rose to the rank of vice admiral in 1821. He was appointed commander in chief of the Mediterranean squadron in 1826 and commanded the English, Russian, and French fleet at the battle of Navarino (q.v.), immediately after which he was recalled for having exceeded his orders. He had been made K.C.B. in 1815 and was promoted admiral in 1837. Consult the *Memoir of the Life of Sir Edward Codrington* by his daughter, Lady Bourchier, including autobiographic notes (London, 1873–75).

CODRINGTON, SIR WILLIAM JOHN (1804–84). An English general, son of Sir Edward Codrington. He entered the army in 1821. During the Crimean War he commanded a brigade as major general at the battle of the Alma (his first action) and at Inkerman, and in 1855 succeeded Sir James Simpson as commander in chief in the Crimea. He was elected to Parliament in 1857, was Governor of Gibraltar from 1859 to 1865, and in 1863 was appointed general.

CO'DRUS (Lat., from Gk. *Kódpos, Kodros*). The reputed last King of Athens, the son of Melanthus (c.1060 B.C.). When the Dorians invaded the Attic territory, an oracle declared that Athens would be saved if its ruler should perish by the hand of the enemy. Codrus, disguised as a peasant, entered the Dorian camp and was struck down in a quarrel of his own making; the Dorians withdrew. His son Medon was the first archon (q.v.), chosen for life.

CODY, HENRY JOHN (1868–). A Canadian educator and clergyman. He was born at Embro, Ontario, and was educated at the Galt Collegiate Institute and at Toronto University, where he graduated with high honors in 1889. He was classical master in Ridley College, St. Catharines, in 1889–93. In 1894 he was ordained a priest of the Church of England in Canada, became curate of St. Paul's Church, Toronto, and was appointed professor of Old Testament exegesis and Church history in Wycliffe College (Toronto). He became professor of systematic theology at Wycliffe and acting rector of St. Paul's in 1899, and rector in 1907. In 1909 he was appointed Archdeacon of York; in 1904 he was elected Bishop of Nova Scotia, but declined the office; and in 1909 he was an unsuccessful candidate for the bishopric of Toronto. He was frequently a delegate to representative conferences and church conventions in Canada, the United States, and Great Britain. An able and eloquent preacher, his theological principles and outlook are largely those of the evangelical or Low Church school.

CO'DY, WILLIAM FREDERICK (1845–). An American scout and showman, known as "Buffalo Bill." He was born in Scott Co., Iowa, and became one of the riders of the Pony Express (q.v.) at its establishment in 1860, and at the beginning of the Civil War was a government scout and guide. In 1863 he enlisted in the Seventh Kansas Cavalry, and at the close of the war contracted with the Kansas Pacific Railroad to furnish buffalo meat to its laborers building the line, in this way earning the name "Buffalo Bill." He was again with the army as scout from 1868 to 1872, when he was elected to the Nebraska Legislature. Later he became judge-advocate-general of the Wyoming National Guard. He served in the Fifth Cavalry in the Sioux War of 1876, and in the battle of Indian Creek killed in personal combat Chief Yellow Hand. In 1883 he organized his "Wild West Show," a representation of actual life on the plains, and in 1887 took the "show" to Europe for the first time. In 1901 he became president of the Cody Military College and International Academy of Rough Riders established on his lands in Wyoming. He is author of several books describing his life on the frontier, including: *The Life of Hon. William F. Cody* (1879); *Story of the Wild West and Camp-Fire Chats* (1888); *The Adventures of Buffalo Bill* (1904); *True Tales of the Plains* (1908). Cody is the last of the picturesque frontier scouts of American history.

COE, GEORGE ALBERT (1862–). An American educator and philosopher, born in Monroe Co., New York. He graduated at the University of Rochester in 1884; studied theology at Boston University and in Berlin; was professor of philosophy in Northwestern University from 1891 to 1909, and then was appointed to the chair of practical theology in Union Theological Seminary, New York. He was president of the Religious Education Association of America in 1909–10. He wrote: *The Spiritual Life: Studies in the Science of Religion* (1900); *The Religion of a Mature Mind* (1902); *Education in Religion and Morals* (1904).

COE, WESLEY ROSWELL (1869–). An American biologist, born at Middlefield, Conn. He was educated at Connecticut Agricultural College and at Sheffield Scientific School (Yale University), and he studied abroad at the universities of Würtzburg and Naples. From 1892 to 1895 he was assistant in biology in Sheffield Scientific School; from 1896 to 1902 he was instructor, in 1902–08 assistant professor of comparative anatomy, and in 1909 he became professor of biology at Yale. He was a member of the Harriman expedition to Alaska in 1899. His writings include: *The Nemerteans* (1901); *The Nemerteans of Porto Rico* (1901); *The Nemerteans of the Hawaiian Islands* (1906); *Echinoderms of Connecticut* (1912).

COEDUCA'TION (Lat. *co-*, together + *educatio*, education, from *educare*, to bring up, to educate). The association of the sexes in the same classes for instruction is a system that prevails generally in the public elementary schools of the United States and quite extensively in Europe. Except in a few large Eastern cities, as New York and Boston, the free public elementary school in the United States is a mixed school. On the other hand, somewhat less than half the private elementary schools in this country are either for boys or for girls exclusively, and in 1910–11 about 10 per cent of the pupils receiving elementary instruction were

in such schools. The English elementary schools have since 1891 become free and coeducational, especially in the rural and small-town school systems. In France each commune having more than 500 inhabitants must establish a separate elementary school for girls, unless a mixed school is sanctioned by the departmental council. In Prussia the Volksschulen, or people's schools, were, according to the Law of 1871, advised to separate the sexes wherever possible, except when there were only two teachers in a school. Nevertheless, in 1911 there were nearly twice as many mixed as separate schools. In Switzerland the elementary schools are very largely mixed schools; but the course of study and the length of the course in some cantons vary for the sexes, while in Basel the boys' and girls' schools are separate. In Sweden practically all, and in Austria 85 per cent, of the public elementary schools are coeducational; while in Italy the reverse is true, only about one-fifth of the schools of this grade having such a character.

When, however, we turn to secondary education, we find that in Europe the sexes are almost universally separated. In Prussia the various classes of gymnasia and realschulen are, with the exception of a few girls' gymnasia, for boys exclusively. Elsewhere in Germany, where girls are given public secondary education, as in Bavaria, Saxony, and Baden, their schools are separated. The French public secondary-school system consists of state lycées and communal colleges for boys and girls separately. The secondary schools of Switzerland and for the most part those of Sweden keep the sexes apart. Since 1902 a large number of public secondary schools have sprung up in England, in 1910–11 of the 862 schools under the supervision of the Board of Education 302 were for girls only and 205 for boys and girls, but in many of the latter separate classes are conducted for the two sexes. The private secondary day schools for girls, of which there is a considerable number, admit young boys, but, as a rule, only up to the age of 9 or 10, when they can enter the secondary schools for boys. In the United States the contrast is striking. In 1911–12 there were 11,224 public high schools, of which 11,063 were coeducational, 26 for girls only, and 35 for boys. Of 2044 private secondary schools, 872 were coeducational, 749 for girls, and 423 for boys, exclusively. The public normal schools reporting to the United States Bureau of Education in 1911–12 numbered 222. Of these, two were distinctly for women; 41 had no men in attendance, though presumably coeducational; the rest contained both sexes. Of the 55 private normal schools 19 prepare kindergarten teachers and have no men in attendance, one is distinctly for women, while three others have no men, and two no women in attendance. The rest have a mixed attendance. The English training schools for teachers, the French primary and superior normal schools, and the Prussian normal schools separate the sexes.

An examination of the facts stated above will show that so far as Europe is concerned they bear out the general theory current there, that the sexes should be separated as far as possible in education. Wherever separate schools can be maintained, the French and Prussian systems require them, and they are plainly favored by the English. Since, however, elementary instruction has come to be regarded as necessary for both sexes, wherever financial considerations prevent separate schools, the elementary school is mixed. And it is this financial consideration that has most largely been the occasion of mixed schools in the United States. Through the efforts of Horace Mann, a system of town coeducational high schools was in 1826 initiated in Massachusetts, and from that time on such schools spread, at first slowly, then rapidly, throughout the Republic, until to-day they are almost within reach of all. The victory of public secondary education was in general the victory of coeducation.

Since the Civil War both elementary and secondary education have been given largely into the hands of women teachers. There accordingly followed a demand on their part for better opportunities for instruction. Oberlin Collegiate Institute in Ohio had, in 1833, admitted women. In 1855 Antioch College, also in Ohio, was founded—coeducational from the beginning, and having as its first president Horace Mann, the ardent advocate of this system. The following State universities were from the beginning coeducational: Utah, opened in 1850; Iowa, opened in 1856; Washington, opened in 1862; Kansas, opened in 1866; Minnesota, opened in 1868; and Nebraska, opened in 1871. The State universities of Indiana and Michigan admitted women in 1868 and 1870 respectively. To-day, of the 39 State universities, all except those of Virginia, Georgia, and Florida are coeducational. Of private colleges, Cornell, after an investigation and stimulated by a generous offer from Henry W. Sage, admitted women in 1872. Other private institutions were, however, somewhat slow to follow. Boston University, founded in 1873, admitted women from the first, and in 1883 the Massachusetts Institute of Technology became coeducational. In 1911–12, of the 596 colleges and universities reporting to the Bureau of Education, 108 were institutions for women only and 341 were coeducational. The principle of coeducation is almost universally accepted throughout the West, and the few remaining institutions of note which do not admit women to any of their courses are on the Atlantic seaboard. At the same time the tendency at present in the East is to strengthen the existing women's colleges, to which one or two notable additions have been made in recent years, bringing the number of first-class institutions up to 16. In addition, all the great university foundations, except Harvard and Princeton, admit women to graduate instruction. Women are also rapidly gaining ground in the professional colleges. In 1911–12, 66 out of 115 colleges of medicine, 46 out of 118 colleges of law, 35 out of 52 colleges of dentistry, and 52 out of 76 colleges of pharmacy in the United States were coeducational.

In Canada McGill University was opened to women in 1883. To-day all the Canadian universities admit women. The leading universities of Australia admit women not only as students, but as lecturers and professors. In 1878 the University of London opened all degrees, honors, and prizes to students of both sexes on equal terms. All the recently established universities, such as Manchester, Liverpool, Leeds, Birmingham, Sheffield, etc., and the University of Wales give similar privileges to women. The University of Durham excludes women only from the degree in theology. Cambridge admits women to nearly all university

and college lectures and grants a diploma to such as fulfill the regular conditions. This degree, however, does not admit them to the governing board of the university. At Oxford women are admitted to nearly all university and college lectures, except those in medicine. They may take the examinations, and the results are announced, but they do not receive a degree. The four universities of Scotland, Aberdeen, St. Andrews, Edinburgh, and Glasgow, admit women to all degrees except in law, and Aberdeen even to that. The Irish universities (Dublin, Belfast, and the constituent colleges of the National University of Ireland) grant equal privileges to both sexes. In France women are admitted to lectures on the same terms with men, professors, however, having a discretionary power of exclusion.

In Germany the struggle of women for admission to the universities has been especially stubborn, and women are now admitted to all the universities in all faculties. Heidelberg, Freiburg, and Göttingen were among the first to grant the degree of Ph.D. to women; but in 1898 Berlin, perhaps the most conservative of all in this respect, bestowed this degree on Fräulein Neumann. In 1909–10, 2324 women, including a number of foreigners, attended the German universities. In Austria, since 1878, women have been admitted to the eight universities as hearers, and since 1897 as matriculated students in the faculty of philosophy. During the winter of 1899–1900, 40 women were registered as regular students at Vienna, and in 1897 the degree of M.D. was granted to Fräulein Possauer. In 1912–13 there were 353 women in attendance. In 1895 the three Hungarian universities were thrown open to women, and graduates of the medical departments are allowed to practice. The Italian universities have, since 1876, all been open to women on the same terms with men, and the female attendance is large. The medical faculties of the Swedish universities were opened to women in 1870, and those of law and philosophy in 1873. In 1899 six women had taken the degree of licentiate in philosophy, and one that of doctor of laws. The latter, Fräulein Eschelsson, was made privatdocent (q.v.), to lecture on civil law. In Switzerland the universities are all open to women, and in most cases on the same terms as to men. At Zurich women were formally admitted in 1872, and they are even permitted to hold professorial chairs. There were, in 1911, 258 women in attendance, and a woman was lecturer on Roman law. Women have been admitted on the same terms as men to the University of Copenhagen since 1875. The Spanish universities and those of the Netherlands are equally open to both sexes. Russian higher education for women has had a stormy history. The medical schools were opened to them about 1860, then closed, and again in 1872 reopened on account of the Nihilism that sprang up among women who went abroad, and particularly to Switzerland, to study. A separate medical school for women was established at St. Petersburg in 1872, suppressed in 1882 on account of Nihilism, and in 1897 reopened. The universities are now closed to women, but there are higher courses given to them at St. Petersburg and Moscow under the Minister of Public Instruction, and in 1910 there were 10,576 attending these university courses of the medical institute for women.

Investigations made by the University of Wisconsin, and in 1893–94 by the University of Virginia, have shown that in coeducational institutions, according to testimony gathered in the United States and England, women equal or even surpass men in excellence of scholarship. Up to 1898, 54 per cent of the women taking examinations for matriculation at the University of London had passed, as against 53 per cent of men for the same period. Nor has the percentage of withdrawals from college on account of health been greater with women than with men. Investigations into the health, etc., of college women are given under COLLEGIATE EDUCATION FOR WOMEN. In the West, where coeducation is practically universal, no evil consequences have sprung from it, and there is but slight demand for separate schools. The main objection of both male and female students to coeducation is that it implies more restraint than exists where the sexes are apart. Of the many arguments for coeducation, doubtless that of economy has been most effective. It is noteworthy that in a report of the Massachusetts Society for the University Education of Women the fact that the University of California had a preponderance of women students was taken as a sign of the need for a separate college. Indeed, it may be said that having won in most cases their contention for admission to institutions for men, the advocates of higher education for women are turning their attention more and more towards separate schools, and that the privilege of separate education is, particularly in the East, coming to be sought and preferred by women rather than by men.

Consult: Clarke, *Sex in Education* (Boston, 1873); *Reports of the United States Commissioner of Education*, 1898, 1891–92, 1894–95; *Circular of Information*, 1883, No. 2; Crawford, *The College Girl of America* (Boston, 1905); G. S. Hall, *Adolescence* (1902); Mills and Tyler, *Boy and Girl, should they be Educated Together* (Oxford, 1906); Shields, *The Education of our Girls* (New York, 1907); Thomas, *Sex and Society* (Chicago, 1906); Woods, *Coeducation* (London, 1903); Walker, *Woman's Unfitness for Higher Coeducation* (New York, 1903).

COEFFI'CIENT (Lat. *co-*, together + *efficere*, to work out, produce). In algebra, any factor of an expression is called the coefficient of the rest of the product. The word, however, is usually applied only to some factor whose numerical value is expressed or known, and which appears first in the product, e.g., in the expression $3ax$, 3 is the coefficient of ax, and $3a$ is the coefficient of x. Vieta seems to have introduced the use of the word in this sense (1591). Since $a = 1 \cdot a$, the coefficient 1 may be understood before any letter. The coefficients in any algebraic equation of the form

$$x^n + a_1x^{n-1} + a_2x^{n-2} + \ldots a_n = 0$$

are related to the roots; thus,

$$r_1 + r_2 + \ldots r_n \equiv \Sigma r_1 = a_1,\ r_1r_2 + r_1r_3 + \ldots$$
$$r_{n-1}\ r_n \equiv \Sigma\, r_1r_2 = -a_2, \ldots r_1r_2 \ldots r_n = \pm a_n.$$

See EQUATION; for differential coefficients, see CALCULUS; and for binomial coefficients, see BINOMINAL THEOREM.

Detached Coefficients. In many operations with algebraic functions, in which the letters are involved in ascending or descending powers, the

required calculation may be performed with coefficients only, e.g., to multiply

$$x^3 + 3x^2y + 3xy^2 + y^3 \text{ by } x^2 + 2xy + y^2$$

$$\begin{array}{c|l} 1 & 1+3+3+1 \\ 2 & \quad 2+6+6+2 \\ 1 & \quad\quad 1+3+3+1 \\ \hline & 1+5+10+10+5+1 \end{array}$$

Hence $x^5 + 5x^4y + 10x^3y^2 + 5xy^4 + y^5$ is the product.

Indeterminate Coefficients. Many functions may be expanded to any desired number of terms by assuming arbitrary coefficients whose values are determined from resulting equations, e.g., to expand $\frac{1}{1-x}$ to four terms, assume

$$\frac{1}{1-x} = a + bx + cx^2 + dx^3 + \ldots$$

Then

$1 = a + (b-a)x + (c-b)x^2 + (d-c)x^3 + \ldots$

$1 \cdot a$, the coefficient 1 may be understood before

$b - a = 0,\ c - b = 0,\ d - c = 0 \ldots$.

that is to say, if $a = 1$, $b = a = 1$, $c = b = 1$, $d = c = 1$, etc. Substituting these values in our assumed equation, we find:

$$\frac{1}{1-x} = 1 + x + x^2 + x^3 + \ldots.$$

The method is as old as literal algebra.

In physics a constant expressing the measure of some property of a substance is often called a coefficient, e.g., the *coefficient of elasticity* is the quotient of the stress by the strain, or the quotient of the applied pressure by the voluminal compression produced. The *coefficient of simple rigidity* is the ratio of the shearing stress to the shearing strain. The *coefficient of refraction* (often called the index of refraction) is equal to the ratio of the speed of light in the first medium to its speed in the second. This ratio for air and water has the value 1.336, representing the refractive power of water. The *coefficient of friction* is the quotient of the resistance due to the sliding of one substance on another and the pressure producing the contact. The *coefficient of expansion* is the amount of expansion of a body of unit magnitude due to an increase of 1° in temperature.

COEFFICIENT OF EXPANSION. See HEAT.

COEFFICIENT OF EXPANSION FOR GASES. See GASES, GENERAL PROPERTIES OF.

COEFFICIENT OF FRICTION. See FRICTION.

COEFFICIENT OF SELF-INDUCTION, and COEFFICIENT OF MUTUAL INDUCTION. See ELECTRICITY: INDUCTION.

COEHOORN, or COEHORN, kō'hôrn. A small mortar, usually made of bronze and formerly used in boats and small vessels and on the gangways of larger ships. Mounted on a wooden block, supplied with handles, it was light enough to be carried by two men. It threw a shell of 12 to 14 pounds' weight. Its name is derived from that of its inventor, Coehoorn (q.v.).

COEHOORN, kōō'hōrn. **COEHORN, or CO'HORN,** MENNO VAN (1641–1704). A Dutch military engineer. He was born near Leeuwarden, and, after studying at the University of Franeker, entered the Dutch service at the early age of 16, as captain in an infantry regiment. He distinguished himself at Maestricht, Graave, and Seneffe in 1673–74. It was at the siege of Graave that he used with effect a mortar of his own design, later called after him. After the Peace of Nimeguen (1679) he was employed to fortify the various Dutch strongholds. In 1685 he published his important work on fortification, *Nieuwe vestingbouw*, which was speedily translated into French and German. Coehoorn was actively employed during the wars of William of Orange against French aggression, and at Kaiserswerth, Bonn, Fleurus, and Namur he showed himself no mean opponent of the great Vauban. He was made a lieutenant general in 1695 and after the Peace of Ryswick (1697) was employed to refortify several of the Dutch towns. When the War of the Spanish Succession began, Coehoorn was at once dispatched to the front and by his brilliant and energetic generalship reduced six of the chief French strongholds. In 1704, while hastening to confer with Marlborough at The Hague, he was stricken down by apoplexy, March 17. Consult: De Peyster, *Life of Coehoorn* (New York, 1860); Bonomer, *Essai général de fortification* (Paris, 1814); Cosseran de Villenoisy, *Essai historique sur la fortification* (1869).

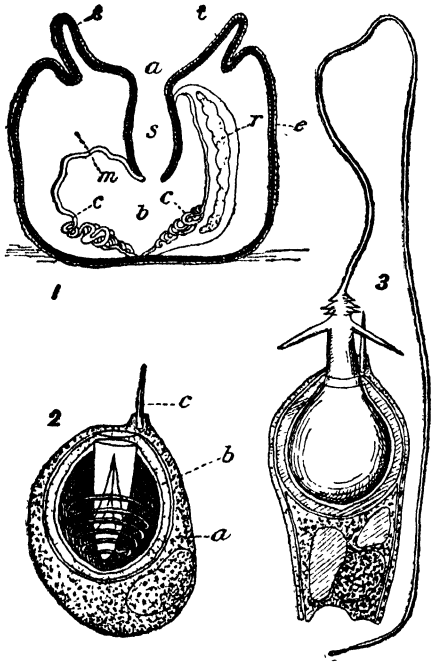
CŒLEBS (sē'lēbz) **IN SEARCH OF A WIFE.** A novel by Hannah More (1809).

CŒLENTERATA, sē-lĕn'tĕ-rā'tà (Neo-Lat. nom. pl., from *cœlenteron*, from Gk. κοῖλος, *koilos*, hollow + ἔντερον, *enteron*, intestine). One of the phyla of the animal kingdom, usually ranked as next to the lowest of the types of Metazoa; the polyps and jellyfishes. It is characterized by the absence of a body cavity and a separate circulatory system, both of these being functionally replaced by the system of chambers or tubes into which the mouth opens. Owing to the fact that this system is not only digestive, but that it takes the place of the body cavity, it is sometimes called the *cœlenteron*. More commonly the cœlenteron is called the gastrovascular cavity, since it not only serves as a stomach for digestion, but, by means of its branches, as a vascular or circulatory system in conveying food (and perhaps oxygen) to all parts of the body. All of the Cœlenterata are more or less perfectly radially symmetrical and generally on the number 4 or 6; i.e., they can be divided in either four or six vertical planes, and the resulting halves will be approximately similar. The Cœlenterata may therefore be defined as radially symmetrical, unsegmented Metazoa, having a gastrovascular cavity. In most Cœlenterata there is no anus, waste matter from the digestive system being ejected through the mouth. Between the endodermal lining of the gastrovascular canals and the ectodermal covering of the body is a structureless layer, known as the supporting layer, or "mesoglœa." This may be very thin and firm, or it may be very thick and gelatinous. It contains scattered nerve and muscle cells, skeletal cells, and pigment cells.

The mouth is usually surrounded with a circle of tentacles, which function both as organs of touch and as capturing organs. The number of these oral tentacles varies from two to several hundred, and their size and shape vary quite as much. On these tentacles, and often on other parts of the body, there are batteries of remarkable stinging cells. (See NEMATOCYST.) These are wanting in only one class, the Ctenophores. The sense organs of the

Cœlenterata are very simple, as a rule, and many forms have no other sense than that of touch. Pigment eyes and positional organs of several kinds occur in the free-swimming forms.

The sexes are separate, and the eggs are set free and fertilized in the water. In their life history the Cœlenterata show some of the most interesting phenomena in the whole animal kingdom. To understand them we must re-



FEATURES OF CŒLENTERATA.

1. General anatomy; *a*, mouth; *s*, gullet, *b*, cavity of the body (enteron); *e*, integument, composed of ectoderm and endoderm, separated by a space; *c c*, convoluted cords (craspeda) containing thread cells (see 2), and forming the free edges of the mesentery (*m*), *t t*, tentacles, *r*, reproductive organ contained within the mesentery. 2. Thread cell or stinging cell (nematocyst) of a hydra, undischarged; *a*, formative matrix (cnidoblast); *b*, coiled thread within the cell; *c*, trigger hair (cnidocil). 3 The same everted and discharged by rupture of the cell following a touch upon the cnidocil.

member that these animals not only reproduce by means of eggs, but even more frequently, like plants, by budding, and that oftentimes, as in plants, the buds do not become detached, but remain connected with the parent stock as long as they live. Moreover, in the type of Cœlenterata we have two very different sorts of individuals—those which are bell-shaped and free-swimming, known as medusæ (q.v.), and those which are more or less cylindrical, and are attached to some object, known as polyps (q.v.). Now, it so happens that the polyp form of a species may give rise to a medusa by budding, and that medusa breaks away and becomes free-swimming; it gives rise to eggs which in turn develop into attached polyps. This process is simple *alternation of generations* (q.v.), i.e., each generation is like its grandparents and not like its parents. The process may become simplified, until the medusa generation is entirely lost, by the medusa bud never getting free from the polyp and ultimately losing even the appearance of a medusa. Or the process may become very much complicated by additional generations produced by budding coming in between the others. The forms which produce the eggs are of course the *sexual* generations, while those that produce the buds are the *asexual*.

The interesting and important question as to whether the first Cœlenterata were medusoid or polypoid forms has been vigorously debated, but is by no means fully determined yet. Owing to the fact that the buds so often remain intimately connected with the parent, we find more or less complicated colonies or stocks very common. These may be free-swimming, as in the siphonophores (q.v.), having then arisen from medusæ; or they may be fixed as in all corals (q.v.), and in such cases have arisen from polyps. In most such colonies, owing to the division of labor that has taken place, we have differently appearing individuals in one colony, some being adapted to locomotion, some to capturing prey, some to digesting food, some for defensive purposes, and some simply for reproduction.

The Cœlenterata are a large group, of many hundred species, widely distributed in the oceans of all parts of the world. Only three or four species are known as occurring in fresh water. As individuals most of the species are small, though a few sea anemones and some medusæ reach a diameter of over a foot; in cŏlonies, however, some of the reef-building corals cover an extraordinary area. As for color, the Cœlenterata are among the most gorgeous of animals; no shades are too exquisite or delicate. Nearly all are carnivorous, though perhaps some forms may use vegetable matter in part. The only species of any direct use to man are the precious and the lime-producing corals.

In classification the Cœlenterata present difficulties. The ctenophores are so different in some important ways from other cœlenterates that some zoŏlogists prefer to regard them as a separate type, especially since two genera are known that connect them directly with the flat worms (Platoda); but as they are radially symmetrical and have a gastrovascular system, they really come within the definition of cœlenterates. The type then may be divided into three great classes: (1) *Hydrozoa* (q.v.), which have no gastral filaments and have an endodermal œsophagus, if any; (2) *Scyphozoa* (q.v.), which have endodermal gastral filaments and give rise to medusæ; (3) *Actinozoa*, or *Anthozoa* (q.v.), which are polyp form, possess mesenteries and never give rise to medusæ; and (4) *Ctenophora* (q.v.), distinguished by having eight meridional rows of swimming plates.

Fossil Forms. The Cœlenterata comprise some of the oldest fossils found in the Lower Cambrian rocks (Archæocyathus and Ethmophyllum); they increased rapidly in variety, and attained already, early in the Silurian, great importance as rock builders in the reef-building corals (see CORAL ISLAND; LIMESTONE; DOLOMITE), which persisted through all formations to the present time, their remains often forming the greater part of whole mountain ranges, as in the southern Alps. Medusoid impressions, representing not only the Hydromedusæ, but also the Scyphomedusæ, occur as early as the Cambrian in Bohemia, Sweden, and North America, and are known

from later rocks. (See MEDUSA; JELLYFISH.) Those suborders of the Hydromedusæ, whose species possess either chitinous-calcareous or calcareous skeletons, viz., the Hydrocorallinæ and Tubulariæ, are also found in the fossil condition, though only sparingly and not until the Mesozoic and Tertiary formations. The most important representatives of the first suborder are the calcareous skeletons of Millepora, appearing in the Eocene, and of the second suborder, the masses of calcareous concentric lamellæ with supporting pillars, which have been described as Ellipsactinia from the Alpine Jurassic, and as Parkeria and Porosphæra from the Cretaceous. Similar calcareous concentrically lamellose forms, but without larger apertures on the surface, the Stromatoporoidea (see STROMATOPORA), are extremely common in the Silurian and Devonian systems, where they were reef builders and important rock-making organisms, being associated with the corals. Their real systematic position being unknown, they are provisionally allied with the Hydromedusæ.

A like relation to the Hydromedusæ is held by the graptolites (see GRAPTOLITA), which, forming chitinous hydroid-like colonies, swarmed, either as holoplanktonic or pseudoplanktonic organisms, in the Silurian seas. They differ in some important features, as the possession of a sicula and virgula, from the hydroids. On account of the world-wide distribution of their species and their short range, they are most important horizon markers or index fossils.

For bibliography of fossil forms, see the articles on CORAL; GRAPTOLITA; MEDUSÆ; STROMATOPORA; JELLYFISH; ETC.

See also ACALEPHÆ; ALCYONARIA; SEA ANEMONES; ANTHOZOA; HYDROID; POLYPS; PORTUGUESE MAN-OF-WAR; SEA FANS; SEA-PEN; SIPHONOPHORA; ZOÖPHYTES. Consult: L. Agassiz, *Contributions to the Natural History of the United States*, vols. iii and iv (Boston, 1862); A. Agassiz, "Monograph of North American Acalephæ," and other papers in the *Memoirs of the Museum of Comparative Zoölogy;* Fewkes, "Aid to Collectors of Cœlenterata," etc., *Bulletin of Essex Institute*, vol. xxiii (Salem, 1893); Minchin, "Cœlenterata" Lankester's treatise on *Zoology*, vol. ii, (London, 1900); Hickson, "Cœlenterata," *Cambridge Natural History*, vol. i (London, 1906); Mayer, "The Medusæ of the World," *Carnegie Inst. Pub., No. 109* (Washington, 1911); Mayer, "Ctenophores of the Atlantic Coast of North America," *Carnegie Inst. Pub., No. 162* (Washington, 1912).

CŒLE-SYRIA (Lat., from Gk. *κοίλη Συρία, Koilē Syria*, hollow Syria). A geographical term used by Greek writers in three different senses. 1. Originally, in the first century of the Seleucid era, Cœle-Syria was the name given to the region lying between the Lebanon and Anti-Lebanon mountains in Syria (so possibly referred to in 1 Esdras iv. 48; cf. Strabo, xvi, 2). "The Valley of Lebanon" (cf. Josh. xi. 17) denotes the same district. 2. Later, in the second century B.C., it was used to designate the whole of Syria, east and west of the Jordan, from the Taurus to Egypt, Phœnicia alone being excepted. Josephus once refers to it under these comprehensive limits (*Ant.* xiv, 4, 5). Such is its significance in most instances in 1 Esdras (ii. 17, 24, 27; vi. 29; vii. 1; xi. 67; cf. Strabo, xvi, 753) and in 1 and 2 Maccabees (1 Macc. x. 69; 2 Macc. iii. 5, 8; iv. 4; viii. 8; x. 11). 3. In Roman times, and even before, Cœle-Syria was again confined to the territory east of the Jordan, consisting of Perea, the Decapolis, and the provinces which constituted the tetrarchy of Philip. In 47 B.C. the Romans gave it into the military charge of Herod. Josephus puts into it the whole extent of eastern Palestine, including Moab and Ammon (*Ant.* xiii, 13, 3).

Later in the Roman period (Diocletian, 297 A.D.) the term receded to the region between the Taurus and Phœnicia; while to-day it denotes practically the valley between the Lebanons, under the Arabic name *El Bika'* ('the cleft').

Hölscher, in his brochure *Palästina in der persischen und hellenistischen Zeit* (1903), surmises that it originally described the entire Syrian country west of the Euphrates, the *'Abar-naharâ* (pp. 6–12).

Bibliography. Smith, *Historical Geography of the Holy Land* (11th ed., 1904); Leary, *Syria, the Land of Lebanon* (1913).

COELHO, kō-ā'lyō (Portug., rabbit), or CONEJOS. The rabbit fish (*Promethichthys prometheus*) of the middle Atlantic, so called in Madeira. See RABBIT FISH.

COELHO, GONÇALO. A Portuguese navigator, the commander of a ship on the coast of Senegambia about 1488. He is supposed to have been the leader of the expedition of 1501 to explore the Brazilian coast. Afterward he was placed in command of six ships sent out from Lisbon in 1503 to seek a passage to the East Indies around the southern part of Brazil, the extent of South America being at that time unknown. After suffering shipwreck and becoming separated from a part of his fleet, Coelho continued his journey of exploration in the remaining ships beyond the present site of Rio de Janeiro, returning to Lisbon in 1506.

COELHO DE ALBUQUERQUE, dā äl'bōō-kĕr'kā, DUARTE (1537–c.1579). A Portuguese governor. He was born at Olinda, Pernambuco, and was the oldest son of Duarte Coelho Pereira, whom he succeeded as captain general of Pernambuco in 1554, which possession, after completing his education in Europe, he governed personally from 1560 to 1572. On his return to Portugal he accompanied Dom Sebastião to Africa, was captured by the Moors, Aug. 4, 1578, and died in captivity at Fez.

CŒLIA GENS. See CÆLIA GENS.

CŒLICA. A collection of short poems by Fulke Greville (1633).

CŒLICOLÆ (Lat., worshipers of heaven). A sect condemned in decrees issued by Theodosius II in 408 (*Cod. Theodos.*, 16, 5, 43) and in 409 (*Cod. Theodos.*, 16, 8, 19) as marked by a "new and unwonted audacity," and, as heretical, ordered to conform within a year or take the consequences. Augustine alludes to it in a letter (Ep. xliv, cap. vi, § 13) written in 398. Consequently the sect was extant in the fourth and the fifth centuries. It seemingly did not last much longer. Its exact nature is difficult to determine, but probably it presented a combination of Jewish and Christian doctrines and practices, among which the most prominent was the use of baptism along with circumcision.

CŒLIUS. See CÆLIA GENS.

COELLO, kō-ā'lyō, ALONSO SANCHEZ (c.1515–

90). A Spanish portrait and historical painter. He was born at Benifayro (Valencia) and apparently formed his style on Italian models. In 1541 he was in Madrid, and in 1552 he went to Lisbon with Antonio Moro and worked there until he succeeded that artist as court painter to Philip II of Spain. He became a great favorite with Philip and painted portraits of the King, his children, and the personages of the court. Many of these perished in the fire of the Prado and Alcazar; among those preserved are those of Don Carlos, the Infanta Isabella, Queen Isabel of the Peace, and Antonio Perez—all in the Prado,—Alexander Farnese (Hermitage, St. Petersburg), and Father Siguenza, the historian. His portraits are vital records of personality, graceful in design and good in color, but they suffer from overelaboration of detail. Among his less interesting religious pictures are five altarpieces with saints painted for the Escorial, "The Martyrdom of St. Sebastian," and "The Marriage of St. Catharine" (Prado).

COELLO, CLAUDIO (c.1630–1693). A Spanish painter, born in Madrid. He studied under Francesco Rizi and afterward under Carreño de Mirando, and probably learned fresco painting from his friend José Donoso. Coello is the last great painter of the Madrid school of the seventeenth century. He painted many large pictures for churches and decorations in fresco for various palaces. All of these works have disappeared, except the ceiling of the vestiary of the Toledo Cathedral. His designs for the triumphal arches raised to celebrate the marriage of Charles II with Marie Louise d'Orléans brought Coello to the notice of the King, and a few years later he became court painter. At this time he painted his greatest picture, the altarpiece of the "Sagrada forma" in the sacristy of the Escorial, which contains more than 50 characteristic portraits; it is baroque in style, carefully drawn, brilliant in color, and original in composition. Coello was now the foremost painter of his time, but the rise of Luca Giordano caused him to lose his prestige and is said to have hastened his death. Coello's mature style was based on that of Rubens and Titian, and his best work is of extraordinary power. His finest pictures are in the Prado (Madrid), in Apsley House and Grosvenor House, London, and in Munich, Budapest, Frankfort, and St. Petersburg galleries. Consult Beruete y Moret, *The School of Madrid* (London, 1909), and Schubert, *Geschichte des Barock in Spanien* (Esslingen, 1908).

CŒLORHYNCHUS, sē'lō-rĭŋ'kŭs (Neo-Lat., from Gk. *κοίλος, koilos,* hollow + *ρύγχος, rhynchos,* nose). A genus of small deep-sea fishes of the family Macruridæ (q.v.), allied to the cods, which inhabit the deeper parts of various oceans and seas. There are many species, of which a common one is the silvery-gray *carminatus* of the West Indian region. Local names for these fish are grenadiers and rat-tails. See Plate of CODFISH AND ALLIES.

COEN, kōōn, JAN PIETERSZOON (1587–1629). The founder of the Dutch colonial power in the East Indies. He entered the service of the East India Company in 1607, and was Governor-General in 1618–23 and again in 1627–29. During his first term he fought successfully against the English and the native princes, and in 1619 destroyed the town of Jacatra, on the site of which he soon afterward founded Batavia. He forced the English to withdraw nearly all their factories from the archipelago and shut them out from the trade of the islands. He introduced the "colonial system" which aimed at a stable population of European stock.

CŒNO'BIA (Neo-Lat. nom. pl. of *cœnobium,* Gk. *κοινόβιον, koinobion,* life in a community, from *κοινός, koinos,* common + *βίος, bios,* life). A term applied to certain colonies of cells among the algæ, remarkable for their regularity of form. They are developed inside mother cells whose contents divide into the required number of daughter cells, which group themselves in the interior. In some forms (*Volvocales*) the individual cells are ciliated, so that the entire colony swims through the water. The colony of *Volvox* may have as many as 22,000 cells. Other colonies are motionless, and contain a small number of cells arranged with beautiful symmetry (*Pediastrum, Scenedesmus,* etc.). The water net (*Hydrodictyon*) is an immense cœnobium of 700 to 20,000 cells.

CŒN'OCYTE (Gk. *κοινός, koinos,* common + *κύτος, kytos,* cavity). The body of an unpartitioned plant, and also a segment of the body of an incompletely partitioned plant, found chiefly among certain algæ and fungi. It differs from a single cell, which has one nucleus, in that the contained protoplasm contains many nuclei. The protoplasm lies in a continuous cavity where portions of it containing the nuclei and other structures slowly circulate. Excellent illustrations are presented by the molds among the fungi and by the order Siphonales among the algæ. For details, see ALGÆ; FUNGI.

CŒNOGENESIS. See PALINGENESIS.

COER'CION (from Lat. *coercio,* from *coercere,* to restrain, from *co-,* together + *arcere,* to confine). In law, such a degree of physical force, or threatened personal violence, or intimidation, applied to a person as constrains or induces him to do some act which, but for such constraint, he would not have done. Under some circumstances coercion applied to a person's wife, husband, or near relative, or injury to his property, will be held to have the same effect as if it were applied to the person himself.

The consequences of an act done under coercion may generally be avoided by a person, on the ground that it is not the product of his free will and he is not considered responsible for it. In the United States, generally, where a person commits a crime under such coercion that he has a reasonable apprehension of instant death or serious bodily harm he is excused from the consequences. A less degree of coercion will render a civil act voidable. See DURESS.

COERCION ACTS. See IRELAND, *History.*

COERNE, LOUIS ADOLPHE (1870–). An American composer, born at Newark, N. J., and educated at Harvard University and the Royal Academy of Music, Munich. He was musical director at Buffalo, N. Y. (1894–97), Columbus, Ohio (1897–99), and Troy, N. Y. (1907–09), had charge of the music department of the Harvard summer session in 1903, and in 1903–04 was associate professor of music at Smith College. After a year as director of the Conservatory of Music at Olivet College he became, in 1910, director of the School of Music and professor of the history and science

of music at the University of Wisconsin. He is author of *Evolution of the Modern Orchestration* (1908). His compositions include: *Hiawatha*, a symphonic poem (Munich, 1893); *Jubilee March* (Chicago Exposition, 1893); *Beloved America; Mass in D Minor; Swedish Sonata; Sakuntala* (1904); and the grand operas, *A Woman of Marblehead* and *Zenobia* (Bremen, 1905–06). *Zenobia* was the first grand opera by a native American composer to be played before a European audience.

CŒUR, kēr, JACQUES (c.1395–1456). A celebrated French merchant and financier, born at Bourges. As early as 1432 he had begun to trade with the Levant and in that year made a journey to Damascus. He soon attracted the attention of the King and received many offices; in 1436 he was master of the mint in Paris; in 1444 he was one of the commissioners for the new Parliament in Languedoc; in 1448 he was an envoy to Pope Nicholas V. He had been ennobled in 1441 by the King, and now he was treated with marked distinction by the Pope, and received a special license to traffic with the infidels. His trade, which had been extensive before, increased rapidly and extended to England, Flanders, Spain, Italy, Turkey, Asia, and Africa. This enabled him to amass great wealth, and he was obliged to contribute largely to the King's purse, especially for the expenses incurred in driving the English out of Normandy. In spite of, or possibly because of, these contributions he became an object of envy, and his fall was rapid. In February, 1450, Agnes Sorel, the King's mistress, died; and Cœur, who was one of her executors, was accused of having poisoned her. There was no reasonable ground for such a charge; nevertheless, the needy and unscrupulous King, in July, 1451, who needed money for the war in Guienne, took advantage of the accusation to have Cœur arrested and his goods seized; Cœur was tried by men whose business it was to convict him without regard to the evidence or to justice; he was condemned to pay to the King an enormous sum and to remain a prisoner until the judgment was fully satisfied. All his property was confiscated, and he was exiled during the royal pleasure. In 1455 he managed to escape and, though pursued, succeeded in reaching Rome, where he was well received by the Pope. He died the following year at Chios. Consult Clément, *Jacques Cœur et Charles VII* (Paris, 1866).

CŒUR D'ALENE, kēr dȧ-lān'. A city and the county seat of Kootenai Co., Idaho, 33 miles by rail east of Spokane, Wash.; on the Cœur d'Alene and Pend d'Oreille, the Northern Pacific, the Cœur d'Alene and Spokane Electric, and the Chicago, Milwaukee and St. Paul railroads; on Cœur d'Alene Lake; and on the Cœur d'Alene, St. Joe, and Spokane rivers (Map: Idaho, B 2). Noteworthy features of the city are Cœur d'Alene College, a Catholic academy, Blackwell and City parks, and the Old Fort Sherman military grounds. There are manufactories of lumber, ties, shingles, and brick, and a trade is carried on in fruits and farm products. The city is in a picturesque region frequented by sportsmen for fishing and hunting. On the shores of Lake Cœur d'Alene Indians held great powwows. Pop., 1900, 508; 1910, 7291.

CŒUR D'ALENE. A lake in Kootenai Co., Idaho (Map: Idaho, A 2). It lies in a wild region on the west side of the mountains of the same name, and is about 30 miles long and from 2 to 4 miles wide. Its waters are cool and clear and afford excellent fishing. It is one of the headwaters of the Columbia, the Spokane River issuing from its northern end. It also receives the St. Joseph River from the east at its southern end.

CŒUR D'ALÊNE. A Salishan tribe formerly holding the territory about the lake and river of the same name in northern Idaho, and now settled upon a reservation in the same country. The name, signifying "awl-heart," is said to have been originally given to a chief of the tribe in derision of his stinginess. The natives call themselves Skitswish, the Skeetsomish of Lewis and Clark. They now number 293. See SALISHAN STOCK.

CŒUR DE LION, dē lē'ŏn' (Fr., Lion-hearted). A title given to Richard I, King of England, for his exploits, mainly in the Crusades.

COF'FEE (Turk., Ar. *qahwe*, the coffee beverage). A beverage made of the roasted seeds of the coffee tree, *Coffea arabica* and other species, natives of Abyssinia, Arabia, and West Africa, now naturalized in many tropical countries. The genus *Coffea* comprises a number of species, but *Coffea arabica* is the species widest known which possesses valuable properties; although *Coffea liberica*, *Coffea stenophylla*, and *Coffea robusta* of West and Central Africa are being cultivated to some extent, the seeds of *Coffea mauritiana*, prepared in the same way, are bitter and slightly emetic. In the wild state *Coffea arabica* is a slender tree, 15 to 25 feet high, with few branches; in cultivation it is seldom allowed to become more than 6 to 10 feet high, and is made to assume a sort of pyramidal form, with horizontal branches almost from the ground. The leaves are evergreen and leathery; the flowers are small, fragrant, and snow-white; and the whole appearance of the tree is very pleasing. The fruit, when ripe, is cherry-like, of a dark-scarlet color, and usually contains two seeds inclosed with their flattened faces together in a tough membrane, called the parchment. Each seed is covered with a thin covering, the silver skin. The seeds are commonly termed coffee beans, a name derived not from any resemblance of the seeds to beans, but from the Arabic word *bunn*, which means 'coffee.' The seeds are also sometimes designated coffee berries. For illustration, see BEVERAGE PLANTS.

The earlier history of the coffee tree is not very clear. It was not known to the Greeks or Romans, but in Arabia it was certainly in use in the fifteenth century. Towards the end of the seventeenth century plants were carried from Mocha to Batavia by Wieser, a burgomaster of Amsterdam, and from the botanical gardens at Amsterdam the Paris Garden obtained a tree. A layer of this was carried out to Martinique in 1720, where it succeeded so well that in a few years all the West Indies could be supplied with young trees. The coffee tree succeeds where the temperature of the year ranges from 60° to 90° F. It does best in a sandy or gravelly soil, well drained, and on high lands or hill ranges from 1000 to 3000 feet above the sea. In Peru and Ecuador it is acclimatized at an elevation of 6000 feet, where, however, frost never occurs. The fruit ripens in hothouses in temperate zones. Coffee plantations

are laid out pretty much in the same way everywhere. Volunteer seedlings that come up under bearing trees or one-year-old trees 12 to 16 inches high are set from the nursery. They need shade at first and in some climates are shaded at all times. In Brazil little of any shade is used. They are pruned to the same height, and the ground between them is carefully kept clear of weeds. Where the climate is dry, abundant irrigation is necessary, but the supply of water is cut off as the fruit begins to ripen, in order to improve its quality. The tree yields its first crop in the third year, and the crop from a full-grown tree may amount to two pounds of coffee beans. The life of a tree is about 40 years. As the coffee tree continues flowering for eight months, its fruits are of very unequal ripeness; in the West Indies and Brazil three gatherings are made annually. The beans are placed on mats or large floors specially adapted for the purpose, where they are dried by the sun's rays, being meanwhile frequently turned. They are passed between rollers to remove the dried pulp of the bean, and the membrane which incloses the seeds themselves, and the coffee is afterward freed from impurities by winnowing, and conveyed in bags to the seaports. As equal care is not, however, bestowed upon the preparation of it in all places where it is cultivated, there are great differences in quality and price. The following sorts are particularly distinguished from one another in commerce: *Mocha coffee*, which comes from Arabia, and is known by its small gray beans inclining to greenish; *Java* or *East Indian coffee*, which has large yellow beans; *Jamaica coffee*, with beans somewhat smaller and greenish; *Surinam coffee*, which has the largest beans; *Bourbon coffee*, with beans pale yellow and almost whitish.

Liberian coffee, *Coffea liberica*, a native of West Africa, is being introduced into some countries, particularly in Ceylon. It is a much larger variety, and thus far it has withstood the ravages of the leaf disease that had nearly destroyed the coffee plantations of that country. This leaf disease, due to *Hemileia vastatrix*, has become very destructive in the East. The American disease, caused by *Stilbum flavidum*, is of importance in Central and South America.

The use of coffee as a beverage was introduced from Arabia, in the sixteenth century, into Egypt and Constantinople. Leonhard Rauwolf, a German physician, was probably the first to make coffee known in Europe, by the account of his travels printed in 1573. Soon after the first introduction of coffee, coffeehouses arose almost everywhere. The first in Europe was established at Constantinople in 1551. In London the first coffeehouse was opened in Newman's Court, Cornhill, in 1652, by a Greek named Pasqua. This Greek was the servant of an English merchant named Edwards, who brought some coffee with him from Smyrna, and whose house, when the fact became known, was so thronged with friends and visitors to taste the new beverage, that to relieve himself from annoyance, Edwards established his servant in a coffeehouse. The first coffeehouse in France was opened at Marseilles in 1671, and in 1672 there was one opened in Paris, which soon had several competitors. In the East coffee is not usually prepared as a beverage in the same way as in Europe, except by Europeans. A decoction of the unroasted seeds is there generally drunk; and for the "Sultan's coffee," the pericarp, with the dried pulp roasted, is employed.

The great demand for coffee has led to the employment of a number of cheaper substitutes, of which chicory (q.v.) root is the best known. Of others, dandelion root, carrot, the seeds of the common yellow iris, cereals, and sweet potatoes may be mentioned. They are prepared by roasting like coffee. The seeds of *Astragalus bœticus* are known on the continent of Europe as Swedish coffee and are said to be the best substitutes for coffee yet discovered. All the substitutes lack the most important constituent of true coffee, viz., caffeine (q.v.), and are therefore very different from it in their qualities. Coffee is subject to great adulteration, most of the articles specified as substitutes being employed for this purpose. The chief substance of mixture is chicory, the use of which is not injurious, however. The chief effect of adding chicory is to deepen the color. The leaves of the coffee trees are used in the western part of Sumatra instead of the seeds. They are prepared by quick drying in a manner similar to that in which tea leaves are prepared, and in this state contain even a larger proportion of caffeine than the coffee beans of our shops. It seems not improbable that the use of the coffee leaf may yet extend very much.

Unroasted coffee has, on an average, the following percentage composition: water, 11.2; protein, 12.1 (including caffeine, 1.2); fat, 12.3; nitrogen-free extract, 42.3; crude fibre, 18.2; ash, 3.9. Roasted coffee contains per cent: water, 1.1; protein, 14.0 (including caffeine, 1.2); fat, 14.5; nitrogen-free extract, 45.8; crude fibre, 19.9; ash, 4.7. Of the total material, some 25 per cent is soluble in water, half of this being nitrogen-free extract. When the beans are roasted till they assume a reddish-brown color, they lose 15 per cent by weight, and gain 30 per cent in bulk; when roasted till they become chestnut brown, they decrease 20 per cent by weight and increase 50 per cent in bulk; while if the roasting is continued till the beans become dark brown, they lose 25 per cent in weight and acquire 50 per cent in bulk. The beans should never be darker than a light brown color, which is quite sufficient to bring out the excellent aroma and other qualities of the coffee; when the roasting is carried further, more or less charring is the result and a disagreeable burned smell is produced, which tends to overcome the natural pleasant aroma. The improvement in flavor by roasting is probably due, in part at least, to the formation of caramel. Coffee does not retard the action of the bowels, as strong infusions of tea tend to do, partly because there is less of the astringent principle, and also owing to the presence of the aromatic oil which tends to move the bowels. The important offices which coffee fulfills are, to allay the sensation of hunger; to produce an exhilarating and refreshing effect; and possibly to diminish the amount of wear and tear, or waste of the animal frame, which occurs more or less at every minute. (See NUTRITION.) The grounds of coffee are nutritious, containing considerable protein, and some of the Eastern nations take advantage of this. The coffee is ground very fine and allowed to remain in infusion, being consumed with it. In most re-

spects coffee possesses properties similar to those of tea (q.v.).

An endless variety of apparatus has been contrived—some of them of great complexity—for preparing coffee for the table. The chief object aimed at by Western nations is to obtain the liquor free from all sediment. In France and elsewhere a very popular beverage is prepared known as *café au lait*. Coffee and milk are boiled separately and mixed in equal proportions immediately before serving. In the so-called French coffeepot boiling water is poured very slowly upon the freshly and finely ground coffee and then allowed to drip through two strainers into the bottom of the pot. This process makes excellent coffee, but is rather slow. Another and much quicker method, used by the Germans, is to infuse coffee like tea, and this has the advantage of bringing out the flavor. In using the Vienna coffeepot the water is poured through a pipe into a lower compartment of the pot. A drum with a strainer at the top is then fitted over the pipe, and in this drum the coffee is placed. A glass cover is adjusted over the pot, which is then placed over an alcohol flame. When the water boils, it rushes through the coffee and through the strainer and pours over the sides of the drum into the upper compartment of the pot, from which it is poured into the cups. The glass cover acts as a condenser of the steam and prevents the aroma from escaping. The nations of the Orient, generally, either follow the usage of the Turks, who drink their coffee thick with sediment; or the nomadic Arabs, who make it from the dried pulp, in much the same manner as tea is prepared in Occidental countries. A more curious method is that of the Somali, who boil the berries in oil and soak maize in the mixture.

The trade in coffee is of great importance. Brazil leads in its production, producing about two-thirds of the world's supply, which in 1910 was 1,996,000,000 pounds. Large exportations are also made from Mexico, Central America, Java, Sumatra, India, Ceylon, Arabia, Hawaii, and the West Indies. The exportation of coffee in 1909–10 was 1,424,000 tons. The coffee crop of the world for 1912–13 is estimated at 984,360 tons. The importation into the United States in 1912 was 885,201,247 pounds, valued at about $117,826,543. Deducting the amount exported, the average consumption per capita is over 9 pounds.

In order to prevent overproduction and maintain prices, Brazil adopted in 1906 a scheme known as the valorization plan, whereby the state through a syndicate held large quantities of coffee, selling only as the market required it. In addition a heavy tax was imposed on all new plantings so as to limit the extension of the area devoted to the crop. At the end of 1909 there were stored in New York and various European ports 901,687,265 pounds of Brazilian coffee subject to the control of the valorization committee. The plan, so far as storage in the United States is concerned, is said to have been abandoned in 1913.

Many sorts of cereal coffee are on the market. They are made of such materials as parched grains, peas, etc. On an average, they contain per cent: water, 6.2; protein, 13.3; fat, 3.4; total carbohydrates, 72.6; ash, 4.5. Only a portion of this material is soluble and enters into the infusion. The infusion of genuine coffee and cereal coffee each contains on the average 98 per cent water and 2 per cent nutritive material. Consult: Walsh, *Coffee: Its History* (Philadelphia, 1902); *Coffee*, pub. by Pan-American Union (Washington, 1909); Keable, *Coffee, from Grower to Consumer* (New York, 1910); McClelland, *Suggestions on Coffee Planting for Porto Rico* (Mayaguez, P. R., 1912). See ADULTERATION.

COFFEE BUG. Any of several sorts of scale insect which live on the coffee tree. The pest is encountered in all parts of the world, and spraying with insecticides or other means of eradication are often necessary to save the crop. It is stated that some years ago the experiment was tried in Ceylon of introducing into the plantations a red ant (*Formica smaragdina*), abundant in many of the gardens and jungles of the island, which feeds greedily on the coccids; but the fierce assaults of the ants on the naked skins of the laborers made them threaten to leave the estates, so that the ants were not further encouraged.

COFFEE-HOUSE POLITICIAN, THE. A play by Fielding (1730).

COFFEEHOUSES. Places of refreshment, first opened in the sixteenth century in Constantinople. In London they were, so to speak, clubhouses free to all who could buy a cup; and yet each was known for its special circle of visitors, literary, scientific, religious, or political. In the absence of newspapers they were a great means of spreading news and of discussing public questions. Nearly all of the middle and higher classes attended them daily, and they came to exert so powerful an influence in politics that in 1675 Charles II attempted to suppress them, but in vain. Consult Macaulay, *History of England*, vol. i (New York, 1858).

COFFEE TREE. See GINKGO.

COF'FERDAM'. A dam built to cut off a small body of water from the adjacent bay, river, etc. It consists of rows of piles, or piles and planking, the space between the rows filled in with clay, cement, or other material. Sheet steel interlocking piling is also extensively used in this form of construction. The term is also applied to iron or steel air-tight inclosures used in digging underwater tunnels or excavations. (See FOUNDATION.) On board modern ships the term is applied to inclosures designed to keep out water. In some cases they surround hatches, but their most important use is to form a continuous double wall at the sides of a ship. Above the protective deck the cofferdam is fitted as a continuous tank (with numerous bulkheads dividing it into sections), extending from that deck to several feet above the water line. It is packed with compressed corn-pith cellulose, or some similar material, which is designed to check the influx of water through a shot hole, which it does by swelling up, as soon as wetted, and closing the hole. If the hole made is not too large or the pressure of water too great, it operates very satisfactorily. Consult Fowler, *Ordinary Foundations, Including the Cofferdam Process for Piers* (New York, 1905).

COF'FEYVILLE. A city in Montgomery Co., Kans., 168 miles by rail south-southwest of Kansas City, on the Verdigris River, and on the Missouri Pacific, the Atchison, Topeka, and Santa Fe, the Missouri, Kansas, and Texas, and the St. Louis, Iron Mountain, and Southern railroads (Map: Kansas, G 8). It contains a

public library. The city carries on an extensive trade with Oklahoma and has strawboard, planing, and flour mills, railroad shops, oil refineries, a plow factory, glass factories, oil-well, packing plant, a large oxide smelter, foundry, vitrified brick works, and a roofing-tile factory. Coffeyville was incorporated in 1871 and adopted the commission form of government in 1909. The water works and the electric-light plant are owned and operated by the municipality. Pop., 1900, 4953; 1910, 12,687.

COF'FIN. In ordinary sense, a burial case; usually a box or chest, in which the dead are inclosed for interment, or sometimes for cremation. In modern times the ordinary material of the case is wood, usually with metallic attachments; lead, copper, iron, glass, terra cotta, stone, etc., are sometimes employed. In earlier times the coffin was chiefly symbolic rather than merely utilitarian, and the material and form varied widely; and the early customs find parallels and interpretations among those of primitive peoples still surviving. Perhaps the simplest type of burial case is that of the Plains Indians, who wrapped the body tightly in a buffalo skin and then placed it upon a scaffold. Among some other tribes the corpse is merely enshrouded in all the habiliments of life, and then placed in a miniature "house of the dead" made in imitation of a dwelling; and this type grades among various peoples into cists of slabs, rock-hewn sepulchres, ornate tombs, and massive sarcophagi. Among riparian and maritime peoples of lowly culture the canoe or boat is the symbol of the home, and the body of a deceased owner may be placed in his vessel, which is portable, and may be borne to a chosen place of sepulture; and it is this type of burial case which can be traced through the customs of many peoples to the ordinary coffin of modern times. See BURIAL; MUMMY CASE; SARCOPHAGUS.

COFFIN, CHARLES CARLETON (1823–96). An American war correspondent, novelist, and juvenile writer, born at Boscawen, N. H. Beginning as a farmer's boy, he tried civil engineering; then returned to farming, then became an expert telegrapher, and finally undertook journalism in Boston. He first attained distinction during the Civil War, as correspondent in the field for the Boston *Journal*. He served that newspaper also during the Austro-Prussian War of 1866. On his return he became popular as a lecturer and was a member of the Massachusetts Legislature (1884–85). Among his many books are: *The Great Commercial Prize* (1858), advocating a transcontinental railroad corresponding with the present Northern Pacific; *Days and Nights on the Battlefield* (1864); *Following the Flag* (1865); *Winning his Way* (1865); *Four Years of Fighting* (1866); *Our New Way Round the World* (1869); *The Seat of Empire* (1870); *Caleb Krinkle* (1875); *History of Boscawen* (1877); *Boys of '76* (1879); *Old Times in the Colonies* (1880); *Building the Nation* (1883); *The Drum-Beat of the Nation* (1887); *Marching to Victory* (1888); *Freedom Triumphant* (1891). He had a facile style and a vein of characteristically New England humor that secured for his books a wide popularity. Consult Griffis, *The Life of Charles Carleton Coffin* (Boston, 1894 and 1898).

COFFIN, SIR ISAAC (1759–1839). A British admiral, born in Boston, Mass., son of a customs official. He entered the British navy in 1773, served in the American Revolution, and rose through all grades to the rank of admiral (1814), though he was not in active sea service after 1794. He was twice court-martialed (1782 and 1788)—both famous cases in admiralty law. In 1818 he was elected to Parliament, where he remained until 1826. In 1827 he founded and endowed, on the island of Nantucket, a school which is still called by his name.

COFFIN, JAMES HENRY (1806–73). An American mathematician and meteorologist, born at Williamsburg, Mass. He graduated in 1828 at Amherst College and in 1829 opened at Greenfield, Mass., the Fellenburg Manual Labor Institution, the first school of the sort in New England and probably in the country. He was professor of mathematics and astronomy in Williams College in 1838–43, and from 1846 until his death he held the chair of mathematics and astronomy at Lafayette College. His scientific attainments were notable. He erected on Mount Greylock, at a height of about 4000 feet above sea level, an observatory, where careful observations were made by means of a self-registering anemometer of his own device. In 1846 he was appointed one of the first collaborators in the work of the Smithsonian Institution, under whose auspices he published *Winds of the Northern Hemisphere* (1853)—his chief volume, based on data collected from more than 600 stations on land and at sea; *Psychometrical Tables* (1856); and *The Orbit and Phenomena of a Meteoric Fire Ball* (1869). The theory of atmospheric circulation, known on the Continent as the Buys-Ballot (q.v.) law, was announced by him in 1853 at a meeting of the American Association for the Advancement of Science. His further works include *Solar and Lunar Eclipses* (1845) and *Elements of Conic Sections* (1849; 6th ed., 1881). Consult J. C. Clyde, *Life of J. H. Coffin* (Easton, 1882).

COFFIN, JOHN HUNTINGTON CRANE (1815–90). An American astronomer. He was born in Wiscasset, Me., graduated at Bowdoin College in 1834, and in 1836 was appointed professor of mathematics in the United States navy. In 1844 he was detailed to the Naval Observatory. He was professor of astronomy and navigation in the United States Naval Academy from 1853 to 1865, and from 1865 was in charge of the *American Ephemeris and Nautical Almanac*. He published *Observations with the Mural Circle* (1845–49); *Observations on the Total Eclipse of the Sun* (1884); *Navigation and Nautical Astronomy* (7th ed., 1898).

COFFIN, JOSHUA (1792–1864). An American antiquarian, born at Newbury, Mass. He graduated in 1817 at Dartmouth College and afterward became an instructor of the poet Whittier, who paid tribute to his memory in the poem "To My Old Schoolmaster." He was a founder of the New England Antislavery Society, of which he became the first recording secretary. He published a *History of Ancient Newbury* (1845), and *An Account of the Principal Slave Insurrections in the Last Two Centuries* (1860).

COFFIN, LONG TOM. A simple, daring sailor in *The Pilot*, by J. Fenimore Cooper.

COFFIN, LORENZO S. (1823–). An American philanthropist, born in Alton, N. H.

He studied for a few months in the preparatory department of Oberlin College, and for a year taught in Geauga Seminary, Chester, Ohio, where J. A. Garfield and Lucretia Randolph (afterward Mrs. Garfield) were his pupils. Coffin located a homesteader's claim near Fort Dodge, and served with the Thirty-second Iowa Infantry during the Civil War. After the war he was a preacher, and from 1883 to 1888 as a member of the Iowa Board of Railroad Commissioners was prominent in securing legislation for safety appliances on railways. He founded (1893) a Railroad Temperance Association, was one of the incorporators of a Home for Aged and Disabled Railroad Men near Chicago, and was president of the Iowa Anti-Saloon League, and candidate for Governor (1907) on the Prohibition ticket, and for Vice President of the United States (1908) on the United Christian ticket.

COFFIN, WILLIAM ANDERSON (1855–). An American landscape painter, born at Allegheny, Pa. He studied at the Yale Art School and afterward in Paris under Bonnat. His work represents the different moods of nature in rural scenery and is characterized by a peculiar personal and uncompromising directness and simplicity. Mr. Coffin was active in the organization of many movements; he was the art director of the Pan-American Exposition of 1901 at Buffalo. At the St. Louis Exposition (1904) he exhibited "Sunrise in Winter" and "Evening, Somerset Valley"; in 1905, "The Last Gleam"; in 1906, "Off New London," "Flame Hill," and "Dawn, October Frost." Other paintings are "Uplands in April" (1911), "Morning" and "Early Autumn" (1912), "A Thunder Shower," "The End of the Storm," and "Early Springtime" (1913). He is represented in the Metropolitan Museum, New York, by "The Rain," and examples of his work are in the museums of Boston, Pittsburgh, Washington, and Buffalo. The Modern Gallery in Venice possesses his "Maple Tree in Spring." Coffin received various medals and is well known as a writer on art. He was elected a member of the National Academy of Design.

COFFINHAL, kō'fê-näl', JEAN BAPTISTE (1754–94). A French Revolutionist. He was born at Aurillac, Cantal, and after studying medicine and law became a lawyer in Paris. He was president of the Jacobin Club, and in 1792 was appointed justice and vice president of the Revolutionary Tribunal. It is related that when Lavoisier was sentenced to death he said, "The Republic has no need of chemists." Later he became implicated in the fall of Robespierre, whom he attempted to rescue, and although he escaped to the Île des Cygnes, he was betrayed, summoned before the Revolutionary Tribunal, condemned, and executed.

COGALNICEANU, kō-gal-nê-chä-än', MICHAEL (1817–91). A Rumanian statesman and historian. He was born at Jassy and was educated at Lunéville (1834) and Berlin. Upon his return he became one of the most active members of the party agitating for the union of Moldavia and Wallachia into a single Rumanian principality, a party which subsequently supported him faithfully. In 1840 he founded the journal *Dacia Literara*, and somewhat later the powerful unionist organ, *Stena Dunărei*. Upon the establishment of the union under Prince Cusa (1859) he was prominent in national affairs, and as Minister of Public Instruction he founded in 1860 the University of Jassy. Under Charles of Hohenzollern, Cogalniceanu was Minister of the Interior from 1868 to 1870; was Minister of Foreign Affairs at the time of the Russo-Turkish War (1877–78), participating in the Congress of Berlin; again Minister of the Interior in 1879–80, and Minister Plenipotentiary at Paris (1880–81). He distinguished himself by his zeal in the cause of educational, legislative, and political reform.

COGHETTI, kō-gĕt'tê, FRANCESCO (1804–75). An Italian historical and religious painter. He was born at Bergamo, and studied there under Diotti di Castalmaggiore and under Camuccini in Rome, where he settled permanently and was for a number of years president of the Academy of San Luca. He was a close student of Raphael, but although a good colorist and much admired in his day, he was never able to free himself from formalism. He painted many altarpieces and frescoes for churches and palaces in Bergamo, Rome, and Savona, notably "The Exploits of Alexander the Great" and the "Parnassus," in the Villa Torlonia, Rome; "The Four Elements" in the Villa Torlonia at Castel Gandolfo. His frescoes and altarpieces in St. Paul's-without-the-walls, Rome, and frescoes in the Basilica at Savona also deserve especial mention.

COGHLAN, kŏg'lan, CHARLES FRANCIS (1841–99). A comedian, of Irish parentage. He was born in Paris, France, and educated for the bar, but adopted the stage, making his first appearance at the Haymarket, London, in April, 1860. After having been leading man of the Prince of Wales's Theatre, he came to America in the autumn of 1876 and played at the Fifth Avenue Theatre, New York City, under Augustin Daly. He was leading man at the Union Square Theatre during the run of *The Celebrated Case*. He appeared at Wallack's Theatre with his sister, Rose; played engagements with Mrs. Langtry (1885–91); created Alec d'Urberville in Mrs. Fiske's production of *Tess of the d'Urbervilles* (1897), and successfully produced (1898) his *The Royal Box*, a version of Dumas's *Kean*. Among his other plays are: *Lady Baxter*, *A Quiet Rubber*, and *Citizen Pierre*. The last he produced without success in the year of his death, which occurred in Galveston, Tex. Coghlan was one of the most graceful yet forceful of modern actors, equally at home in old English comedy and in modern emotional rôles. Consult Clapp and Edgett, "Players of the Present," in the *Dunlap Society Publications* (New York, 1899).

COGHLAN, ROSE (1853–). A British-American actress, sister of Charles Coghlan. She was born at Peterborough, England, and her theatrical career began at the Greenock Theatre, Scotland, where she appeared as one of the witches in *Macbeth*. She was first induced to come to America by E. A. Sothern in 1871 and appeared in burlesque at Wallack's Theatre, New York, during the season of 1872–73. From 1873 to 1877 she was again in England, where she played for a time with Barry Sullivan in *Twelfth Night*, and later with Joseph Jefferson in *Rip Van Winkle*. In 1877 she reappeared at Wallack's; the following year she was the Countess Zicka in the first American presentation of *Diplomacy*. In 1880 she made a great hit as Stephanie in *Forget-Me-Not*. She remained at Wallack's Theatre most of the time till 1888, when she played Lady Teazle in *The*

School for Scandal. Her répertoire there included a wide range of characters, which she acted with great resource of feeling and technique. Since then she has starred and has appeared in several large melodramatic productions. In 1909–10 she was with the New Theatre Company, in 1911 she played in *The First Lady in the Land*, and in 1913 she was in the cast of *Fine Feathers*. Consult: McKay, *Famous American Actors of To-day* (New York, 1896); Strang, *Famous Actresses of the Day in America* (Boston, 1899).

COGHLAN, Timothy Augustine (1856–). An Australian statistician, born and educated in Sydney, New South Wales. In 1884 he became assistant government engineer for rivers and harbors, and in 1886–1905 was government statistician of New South Wales. He served also as registrar of friendly societies (1886–1905), member of the Public Service Board (1896–1900), and chairman of the Board of Old-Age Pensions. In 1905 he went to London as Agent General for New South Wales and representative of the Australian Commonwealth on the Pacific Cable Board. Among his important statistical and descriptive works on Australia are: *Wealth and Progress of New South Wales* (1887 et seq.); *Statistics of the Seven Colonies of Australasia* (1897; 1899); *Childbirth: A Study in Statistics* (1900).

COGIA HASSAN ALHABBAL, kō'gyȧ häs'sȧn ȧl-häb'bȧl. One of the tales of the *Arabian Nights.*

COGIA HOUSSAN, hōōs'sȧn. In *The Arabian Nights*, the captain of the Forty Thieves, detected and slain by Morgiana.

COGNAC, kō'nyȧk' (Lat. *Condate*, Gall. *Condate*, confluence, from *con*, Lat. *cum*, together + *de*, Skt. *dhā*, to place). A town in the Department of Charente, south France, picturesquely situated on an old castle-crowned hill overlooking the river Charente, 31 miles west of Angoulême by rail (Map: France, S., D 3). Cognac is celebrated as the place where the famous Cognac brandy is manufactured, and is the centre of that trade in Charente. Champagne is also made extensively in this district. Francis I was born here in 1494. Pop., 1901, 19,483; 1911, 19,188. Consult L. Ravaz, *Le pays du Cognac.*

COG'NATE (Lat. *cognatus*, cognate, from *co-*, together + *gnatus*, born, from *nasci*, to be born; connected with Gk. *γίγνεσθαι, gignesthai*, Skt. *jan*, to be born). A term applied to relatives of the female branch of a family. It is most commonly employed in the civil (Roman) law and in its technical sense did not come into general use in the English law. In many systems of law cognates rank next after agnates in the inheritance of property. The term is not generally used in the United States. See Agnate; Descent; Inheritance.

COGNIARD, kō'nyȧr', Charles Théodore (1806–72) and Jean Hippolyte (1807–82). Two French dramatists and theatrical managers. They were brothers, and wrote themselves and in collaboration with other dramatists about 200 fairy plays, vaudevilles, and other light pieces, which were unusually successful. Their first success was *La cocarde tricolore* (1831), which was played nearly 200 times. Between 1845 and 1869 they were directors, either together or separately, of the Porte-Saint-Martin, the Vaudeville, and the Théâtre des Variétés. Among their best-known pieces are: *Le pays latin* (1832); *Le royaume des femmes* (1833); *Les Chauffeurs* (1835); *La fille de l'air* (1837); *La chatte blanche* (1852); *Les bibelots du diable* (1858); *Le pied de Manton* (1860).

COGNIET, kō'nyā', Léon (1794–1880). A French historical and portrait painter. He was born in Paris, studied under Guérin and at the Ecole des Beaux-Arts, and won the Prix de Rome in 1817. He first attracted attention with "Marius among the Ruins of Carthage" (1824), now in the Museum of Toulouse. His other important works include "The Massacre of the Innocents" and his masterpiece, "Tintoretto Painting the Portrait of his Dead Daughter" (1845), in the Bordeaux Museum. His portraits include those of Maréchal Maison, Louis Philippe, and M. de Crillon. He decorated several ceilings in the Louvre and the Halle de Godiaque in the Hôtel de Ville, Paris, and a chapel in the church of the Madeleine. At first a Classicist, he early joined the Romantic school. His pictures are fine in composition, but lack creative imagination and are weak in color. He was a noted teacher at the Ecole des Beaux-Arts, Bonnat and Meissonier having been among his pupils.

COGNITION. See Knowledge.

COG'NIZANCE, in legal use commonly kŏn'ĭzans (Lat. *cognitio*, investigation, inquiry, from *con*, with, and *nosco*, know). 1. An old term of the common law signifying legal jurisdiction or an acknowledgment of a fact having legal consequences.

Cognizance of Pleas was jurisdiction of causes, a privilege granted by the King to a city or town to institute a tribunal for the trial of suits. Sometimes such a jurisdiction was conferred to the exclusion of that of the regular tribunals of the kingdom. It was by such a grant that the universities of Oxford and Cambridge acquired their legal jurisdiction. It is in this sense that the expression *claim of cognizance* is used, when one court intervenes to assert jurisdiction over a cause which has been wrongfully instituted in another court. The term is not employed in this special signification in the United States, though it occurs in the general sense of jurisdiction, as in the expression "to take cognizance of a cause of action." See Jurisdiction.

In pleading, cognizance signifies a formal acknowledgment of an act alleged, as in replevin, an acknowledgment of the taking of the goods sought to be recovered; and in the fictitious process known as "levying a fine," an acknowledgment by the defendant that the lands claimed are the property of the claimant. See Fine; Replevin; Pleading.

2. A term in heraldry, used in a loose manner, sometimes to signify a crest (q.v.), and sometimes a badge (q.v.) or other distinguishing mark.

COGNO'MEN (Lat., from *co-*, together + *(g)nomen*, name; connected with Lat. *gnoscere*, Gk. *γιγνώσκειν, gignōskein*, Skt. *jñā*, Ger. *kennen*, Eng. *know*). A term used by the ancient Romans for the name by which a *familia* was distinguished from other *familiæ* of a *gens* (q.v.). A Roman of social position ordinarily had three names; of these the last was his cognomen. In *Marcus Tullius Cicero*, e.g., the first name is the *prænomen*, or personal name; the second the *nomen*, or name of the gens; the third is the *cognomen.*

COG'NOSCEN'TI. See Connoisseur.

COGNO'VIT (Lat., he has acknowledged). A written confession of liability by the defendant in an action authorizing the plaintiff to enter judgment for a specified sum, either absolutely or upon terms as to time of entry or payment. It is given only after the action is begun, and before the defendant has answered or otherwise pleaded, and in this respect differs from a confession of judgment, now used in England and in most of the States of the United States, which is given before the action is commenced, but is about the same in form. As originally used, the cognovit is superseded in almost every jurisdiction to-day by an order of the court entered on consent. It is still in use in some of the States of the United States where the forms of common-law pleading are retained.

COGS'WELL, JOSEPH GREEN (1786–1871). An American librarian and bibliographer. He was born in Ipswich, Mass., graduated at Harvard in 1806, and studied law, but preferred to teach, and became a tutor at Harvard in 1814. With George Ticknor he spent two years (1816–18) at the University of Göttingen. In 1820 he was made professor of mineralogy and geology and librarian of Harvard College, and in 1823, with George Bancroft, founded the Round Hill School at Northampton, Mass. He removed to New York, to become editor of the *Review* in that city, in 1836; continued in that work until 1842; became a personal friend of John Jacob Astor, and was appointed one of the trustees of the fund to create the Astor Library. He was, besides, the chief adviser of the philanthropist in planning this library. He became superintendent in 1848 and went abroad to purchase volumes for the collection. He also undertook the preparation of an analytical and alphabetical catalogue of the collection. Consult Ticknor (ed.), *Life of Joseph Green Cogswell, as Sketched in his Letters* (Cambridge, Mass., 1874).

COGSWELL, MASON FITCH (1761–1830). An American physician, adopted son of Samuel Huntington, President of the Continental Congress. He was born in Connecticut, graduated at Yale in 1780, and settled in Hartford, where he was instrumental in establishing the first asylum for the deaf and dumb in America. He was also a founder of the Connecticut Retreat for the Insane at Hartford and introduced into America the methods of removing a cataract from the eye and of tying the carotid artery (1803).

COGWHEEL. See GEAR WHEEL.

COHABITA'TION (from Lat. *cohabitatio,* from *cohabitare,* to dwell together, from *co-,* together + *habitare,* to dwell). The act of a man and woman in living together as husband and wife. Cohabitation does not necessarily involve the notion of sexual intercourse, and in a strict legal sense, as applied to husband and wife, may mean only *consortium,* and not *concubitus;* but the term is commonly held, even in law, to carry with it the latter implication, and this is always so where the parties are unmarried. It raises a legal presumption of marriage between the parties cohabiting, which may, however, be rebutted by other evidence. See MARRIAGE, and the authorities there referred to.

COHAN, GEORGE MICHAEL (1878–). An American comedian and playwright, born in Providence, R. I. He first appeared on the stage when nine years old in *Daniel Boone;* later "The Four Cohans" became one of the most popular attractions on the vaudeville stage. Between 1899 and 1914 George M. Cohan wrote and produced a large number of musical comedies and plays, in several of which he himself took leading parts. The list includes: *Little Johnny Jones, The Governor's Son, Forty-five Minutes from Broadway, George Washington, Jr., The Yankee Prince, Get-Rich-Quick Wallingford, The Little Millionaire, Broadway Jones,* and *Seven Keys to Baldpate.* All these plays were very popular, and while not pretentious, had the merit of wholesomeness. Cohan had control of several theatres in New York City until February, 1914, when he retired from business to devote himself to writing and composing.

COHEN, kō'en, EMIL (1842–1905). A German mineralogist, born in Jutland. He studied in the universities of Berlin and Heidelberg and from 1867 to 1872 was assistant in mineralogy in the latter university. He then spent a year and a half in South Africa and, after devoting the following years to mineralogical studies and to the preparation of works descriptive of his African explorations, became professor of petrography in Strassburg in 1878. In 1885 he was made professor of mineralogy in Greifswald. His published works include the following: *Geognostisch-petrographische Skizzen aus Südafrika* (1874); *Erlauternde Bemerkungen zu der Routenkarte einer Reise von Lydenburg nach den Goldfeldern und von Lydenburg nach der Delagoabai im östlichen Südafrika* (1875); *Sammlung von Mikrophotographien zur Veranschaulichung der mikroskopischen Struktur von Mineralien und Gesteinen* (1881–83; 3d ed., 1899); *Meteoritenkunde* (2d ed., 1903).

COHEN, HENRI (1808–80). A French numismatist and musician, born at Amsterdam, Holland. For a number of years he was curator of the numismatic collection in the National Library in Paris. He wrote the valuable *Description générale des monnaies de la république romaine* (1857) and *Description historique des monnaies frappées sous l'empire romain* (7 vols., 1859–68; 2d ed., prepared by Feuardent, 1880 et seq.). He also wrote an excellent *Guide de l'amateur de livres à vignettes du XVIIIe siècle* (1870; 5th ed., 1886), and was known as a composer and writer on the theory of music.

COHEN, HENRY (1863–). An American rabbi, born in London. He was ordained rabbi in 1884, and was pastor at Kingston, Jamaica (1884–85), Woodville, Miss. (1885–88), and Galveston, Tex. (1888–). His publications include *Six Hundred Talmudic Sayings* (1894; 2d ed., 1910) and a translation from the German of Nahida Remy, *Prayer in Bible and Talmud* (1894; 2d ed., 1910).

COHEN, HERMANN (1842–). A German philosopher, born at Koswig, and educated at Breslau, Berlin, and Halle. In 1875 he became professor at Marburg. As one of the leaders of the Neo-Kantian movement (see NEO-KANTIANISM), he did perhaps as much as any other follower of Kant to make the Critical Philosophy better known to students. This he has accomplished by banishing the "thing-in-itself" from his system and bringing philosophy into closer connection with the sciences. His contributions to the interpretation of Kant's writings are of permanent value. His works include *Kant's Theorie der Erfahrung* (1871; 2d ed., 1895), which led to the modification of Lange's previously published views of Kant;

Kant's Begründung der Ethik (1877); *Platon's Ideenlehre und die Mathematik* (1879); *Ein Bekenntniss und die Judenfrage* (1880); *Die Nächstenliebe im Talmud* (1884); *Kant's Begründung der Aesthetik* (1889); *System der Philosophie* (1902–06); the 5th–7th eds. of Lange's *Geschichte des Materialismus; Kommentar zu Kants Kritik* (1907); *Religion und Settlichkeit* (1907). Consult Cassirer, in *Kantstudien*, vol. xvii (1912), and *Philosophische Abhandlungen, H. Cohen zum yosten Geburtstag dargebracht* (Berlin, 1912).

COHEN, JACOB (DA SILVA) SOLIS (1838–). An American physician, born in New York City, brother of Solomon Solis Cohen. He was educated at the University of Pennsylvania. In 1861, at the outbreak of the Civil War, he became assistant surgeon of the Twenty-sixth Pennsylvania Regiment, and later he was assistant surgeon with Dupont's expedition to Port Royal and with the South Atlantic blockading squadron; from 1864 to the close of the war he served in the army hospitals in Philadelphia. There after 1866 he practiced his profession, giving special attention to diseases of the throat and chest. He also accepted a professorship in the Philadelphia Polyclinic and College for Graduates in Medicine. His publications include: *Inhalation: Its Therapeutics and Practice* (1867; 2d ed., 1876); *Diseases of the Throat* (1872; 2d ed., 1879); *The Throat and the Voice* (1879).

COHEN, JULIUS BEREND (1859–). An English chemist, born at Manchester. He was educated at Owens College, Manchester, and at the University of Munich. From 1884 to 1890 he was demonstrator in chemistry at Victoria University, Manchester, and from 1890 to 1904 was lecturer on organic chemistry at the Yorkshire College. In the latter year he became professor of organic chemistry at the University of Leeds. Besides a number of researches his publications include: *Theoretical Organic Chemistry* (1902); *Practical Organic Chemistry* (1910); *Organic Chemistry for Advanced Students* (2 vols., 1907–13); *Organic Chemistry* (1912); *Smoke: A Study of Town Air* (1912).

COHEN, KATHERINE M. (1859–1914). An American sculptor and painter. She was born in Philadelphia and studied at the Pennsylvania and New York academies of design under Boyle and Saint-Gaudens, and also in Paris under Mercié and Puech. She is best known for her reliefs and decorative figures of half-legendary personages, such as "Priscilla," "Romola," and "Rabbi-Ben-Ezra." An heroic figure, "The Israelite," was exhibited in the Paris Salon of 1896, and one of her most important works, the statue of General Beaver for the Smith Memorial, is in Fairmount Park, Philadelphia. Among her portrait busts are those of Mayor Sulzberger and Lucien Moss. She is also known as a painter of figures, landscapes, and miniatures. Her work is imaginative and shows delicacy of treatment.

COHEN, SOLOMON SOLIS (1857–). An American physician, born in Philadelphia, brother of Jacob (da Silva) Solis Cohen. He was educated at Jefferson Medical College, where he served as lecturer on clinical medicine from 1888 to 1902, and thereafter as professor. From 1887 to 1902 he was also professor of clinical medicine and therapeutics at the Philadelphia Polyclinic and College for Graduates in Medicine; and in 1890–92 he lectured on therapeutics at the Dartmouth Summer School. He was recorder of the Association of American Physicians from 1902 to 1913. He served as physician to the Philadelphia General, Jefferson, Rush, and Jewish hospitals, edited *System of Physiologic Therapeutics* (11 vols., 1901–05), and was for a time editor of the *Philadelphia Polyclinic* and coeditor of the *American Hebrew*. His publications also include: *Therapeutics of Tuberculosis* (1891); *Essentials of Diagnosis* (1892; 2d ed., 1900); *The True Rôle of Drugs in the Management of Tuberculosis* (1901).

COHERER (from *cohere*, from Lat. *cohærere*, to cling together, from *co-*, together + *hærere*, to cling). An instrument invented in 1890 by Professor Branly, of Paris, for the detection of so-called "electrical waves," i.e., of waves in the ether produced by electrical oscillations. (The principle of this action had been discovered before by Munk, Varley, and Calzecchi-Onesti.) The coherer was carefully studied by Lodge in England in 1894 to detect the existence of electric waves created by a spark discharge and by Popoff in Russia in 1896 in investigations on atmospheric electricity. Marconi then adopted the instrument for use in wireless telegraphy, and in an improved form it figured in his patent specifications. It consists essentially of a tube containing minute filings of some metal, into each end of which a wire enters for a sufficient distance. It has been observed that under ordinary conditions such a tube does not allow an electric current to pass; but, if electrical waves fall upon it, a current can be passed most easily, thus affording a simple means of telling when electrical waves are passing. One explanation is that, when put in the tube loosely, the filings do not make electrical connection, owing to thin surface layers of condensed gases, etc.; but under the action of the electrical waves these layers are cleaned off, possibly by minute sparks passing between the filings, and thus establishing metallic connection through the tube. If, after the waves have passed, the tube is tapped forcibly, the filings are knocked apart, and the tube again becomes a nonconductor. The metals whose filings are used ordinarily are silver and nickel. Others might be used, but it has been shown that with some substances the electrical resistance is increased by the waves, not decreased. Consult Fleming, *An Elementary Manual of Wireless Telegraphy and Wireless Telephony* (London, 1908); id., *The Principles of Electric Wave Telegraphy and Telephony* (ib., 1910); Moncton, *Radio-Telegraphy* (New York, 1908). See WIRELESS TELEGRAPHY.

COHE'SION (Fr. *cohésion*, It. *coesione*, from Lat. *cohærere*, to cling together). The name given to that property of matter observed when two portions of the same matter are brought closely into contact; thus one speaks of the cohesion of water, meaning the forces manifest at any point in water owing to the mutual action of the molecules. Sometimes the word is used to express the phenomenon observed when two pieces of a solid are stuck together, such as two pieces of glass, two pieces of lead, etc. The forces of cohesion in a liquid are greatly affected by having substances dissolved in it, and, in short, by anything which affects the molecules or their arrangements.

COHN, ADOLPHE (1851–). An American educator, born in Paris and educated at the University of Paris. He served in the Franco-

Prussian War, studied law in Paris, and in 1875 came to the United States. In 1882 he became tutor in French at Columbia University, where, after teaching French at Harvard in 1884–91, he became professor of Romance languages and literatures. He edited many French textbooks and, with Curtis Hidden Page, a series called *French Classics for English Readers*, and delivered the lecture on French literature in the Columbia University *Lectures on Literature* (1911). He contributed to the first edition of the NEW INTERNATIONAL ENCYCLOPÆDIA.

COHN, kōn, FERDINAND JULIUS (1828–98). A German botanist, born at Breslau. He studied at the universities of Berlin and Breslau, became connected with the latter institution in 1850, and was made full professor there in 1871. His investigations concerned chiefly the physiology and morphology of plants, to our knowledge of which he made numerous contributions of the highest importance. He is best known for his careful studies of the life histories of the lowest forms of plant life, of great service in promoting bacteriology. He also studied insect-killing fungi and germ-caused diseases, and made a microscopic analysis of water. Besides a number of papers on special topics of his science, his published works include the following: *Zur Naturgeschichte des Protococcus pluvialis* (1850); *Untersuchungen über die Entwickelungsgeschichte der mikroskopischen Algen und Pilze* (1853); *Die Wunder des Blutes* (1854); *Anthrax* (1876); *Neue Untersuchungen über Bakterien* (1872–75); *Die Pflanze Vortrage aus dem Gebiete der Botanik* (2d ed., 1895–97). He also edited the *Beitrage zur Biologie der Pflanzen* and the *Kryptogamenflora Schlesiens*. One of his best-known contributions to science was the demonstration that bacteria are plants. Consult Pauline Cohn, *Ferdinand Cohn, Blatter der Erinnerung* (Breslau, 1901).

COHN, GUSTAV (1840–). A German economist. He was born at Marienwerder and studied at Berlin and Jena. His tour through England in 1873 gave him the materials for his work, *Untersuchungen über die englische Eisenbahnpolitik* (1874). In 1884 he became professor of political science at Göttingen and in 1892 was a member of the Imperial Commission to investigate the affairs and regulations of the Stock Exchange. His works include: *System der Nationalokonomie* (1885 and 1898; Eng. trans. in the *Economic Studies* of Chicago University); *Zur Geschichte und Politik des Verkehrswesens* (1900); *Zur Politik des deutschen Finanz-Verkehrs- und Verwaltungswesens* (1905); *The Science of Finance* (trans. by T. B. Veblen, 1895); *Ueber die staatswissenschaftliche Vorbildung zum höhern Verwaltungsdienst in Preussen* (1900).

COHNHEIM, kōn'hīm, JULIUS FRIEDRICH (1839–84). A German pathologist, born at Demmin in Pomerania. After studying medicine at several universities, including those of Berlin and Würzburg, he became connected with the pathological institute of the Charité, Berlin. In 1868 he was made professor of pathology at Kiel, from 1872 to 1878 was professor at Breslau, and during the last years of his life held a similar position at Leipzig. His published works include the following: *Untersuchungen über die embolischen Prozesse* (1872); *Neue Untersuchungen über die Entzündung* (1873); *Vorlesungen über allgemeine Pathologie* (1877–80); *Die Tuberkulose vom Standpunkte der Infektionslehre* (1881). Cohnheim was the first to demonstrate that pus consists largely of white blood corpuscles, thus throwing much light on the nature of inflammations. Consult: Ponfick, *Gedachtnisrede auf Cohnheim* (Breslau, 1884); also, Kühne's biographical sketch published with the *Gesammelte Abhandlungen von J. F. Cohnheim* (Breslau, 1885).

CO'HO (American Indian). A local name in Alaska for the silver salmon (*Oncorhynchus kisutch*, or *millstschitsch*). See SALMON.

COHOES, kō-hōz'. A city in Albany Co., N. Y., 9 miles (direct) north of Albany; at the junction of the Mohawk and Hudson rivers, and on the Delaware and Hudson and the New York Central railroads (Map: New York, G 5). The Erie and Champlain canals also pass through the city, uniting a short distance to the south. In this section of the Erie Canal there are several locks which lift the boats from the lower level of the Hudson valley to that above the Mohawk Falls. The city is furnished with abundant water power by the Mohawk, here crossed by a long railroad bridge affording a fine view of the falls, which are 75 feet high and 900 feet wide. A dam above the falls stores the water which is supplied by canals to the mills and factories. Cohoes is noted as a manufacturing centre, its industries including large cotton, woolen, and knitting mills, axe factories, rolling mills, iron foundries, machine shops, furniture, soap, paper-board, sash and door, and shirt and collar factories. Cohoes was for many years a part of the Rensselaer Manor. Its first settlers were Dutch and probably came as early as 1630. It was incorporated as a village in 1848 and in 1870 was chartered as a city. The water works are owned by the municipality. Pop., 1900, 23,910; 1910, 24,709.

CO'HORT (Lat. *cohors*, originally meaning inclosure, connected with Gk. *χορτός, chortos*, garden, OIr. *gort*, sedge, Ger. *Garten*, garden, AS. *geard*, Eng. *yard*). A portion of a legion in the ancient Roman armies. Usually there were 600 men to a cohort, and 10 cohorts to a legion (q.v.). (See CENTURION.) The term *Prætoria Cohors* sometimes denoted, under the Republic, the suite of the governor of a province; under the Empire it designated the famous Prætorian Guard, bodyguard of the Emperor, which had so much to do with the making and unmaking of Roman emperors.

CO'HOSH. The American Indian name of black snakeroot (*Cimicifuga racemosa*). It occurs in the United States from Maine to Wisconsin and south to Florida. The rhizomes, which are employed in medicine, contain resin, wax, tannin, and a crystalline principle. Alterative, sedative, and emmenagogue properties are attributed to it. See Plate with article SANGUINARIA.

COIF (from OF. *coife*, Fr. *coiffe*, It. *cuffia*, from ML. *cofia*, coif, from OHG. *chuppa*, cap under the helmet, from *chuph*, Ger. *Kopf;* connected with AS. *cuppe*, Eng. *cup*). 1. Originally a covering for the head, worn by both men and women; later a sort of skullcap, especially the one worn by English serjeants at law. The old idea that the coif was intended to conceal the ecclesiastical tonsure has no foundation. The origin of the legal coif was a black skullcap worn on top of the white coif; when the wigs came into fashion, the coif became the black patch with a white edge, worn on top of the

wig; this is the form used by English serjeants at law.

2. In the armor of the Middle Ages, a defensive hood, usually surmounted by a helmet, sometimes continuous with the hauberk and sometimes separate. Consult Pulling, *Order of the Coif* (London, 1897).

COIMBATORE, kō-ĭm'bȧ-tōr', or **KOIMBATUR**, kō-ĭm'bȧ-tōōr' (Telugu, also *Koiampadi, Koibmutur, Koiamuturu*). A city in Madras, British India, capital of the district of the same name, situated near the left bank of the Noyil, a tributary of the Kavery (Map: India, C 6). It lies 305 miles by rail southwest of Madras, and is situated 1483 feet above sea level. It is cool and healthful, but the adjacent plains are malarious. It is the seat of French, English, and German missions, and is the educational centre of the district, with Coimbatore and St. Michael's colleges and a college of agriculture. Convicts numbering 1340 are engaged in weaving cotton fabrics; its other chief products are yarn, leather, coffee, sugar, spirits, and saltpetre. The suburban Pagoda of Perur is an important archæological structure. Pop., 1891, 46,400; 1901, 53,080; 1911, 47,007.

COIMBRA, kō-ēm'brȧ. A city of Portugal, capital of a district of the same name, in Beira, picturesquely situated, partly on a steep rock and partly in a plain, amid vineyards and orange orchards, on the right bank of the river Mondego, 110 miles north-northeast of Lisbon (Map: Portugal, A 2). The upper town is badly built, its streets being steep, narrow, and dirty. Of the public buildings, the most noteworthy are the cathedral, the churches of São Francisco and São Salvador, and the convents of Santa Cruz and Santa Clara. There is here a fine aqueduct of 21 arches, which dates from the sixteenth century. The famous University of Coimbra (q.v.) is the oldest university in Portugal. Coimbra has manufactures of linen, woolen, earthenware, and combs. Pop., 1900, 18,424. The city Coimbra occupies the site of the Roman Æminium, according to a fourth-century Latin inscription, but the name was transferred in the ninth century with the transferal of the bishopric from the neighboring town of Condeixa, which had been called till then Conimbriga, or Conembrica. In 1064 it was taken from the Moors by Ferdinand I, and for 250 years (1129–1383) was the capital of Portugal. It was the scene of prolonged fighting between Masséna and Wellington in the campaigns of 1810 and 1811.

COIMBRA, UNIVERSITY OF. A national university of Portugal and, until the foundation of the University of Lisbon, in 1910, the only university in that kingdom. With some 1400 students in law, medicine, mathematics, and philosophy, its library, hospitals, observatory, museums, and laboratories, it is an institution of great national importance. Its history is long and checkered. Founded about 1290 by the poet king, Diniz, at Lisbon, a supplementary charter was issued in 1308, transferring it, because of dissensions between town and gown, to Coimbra, the first of a long series of migrations which make it unique among universities. From 1308 to 1380 it vibrated between Coimbra and Lisbon, in the latter year being settled at Lisbon. In 1537 it migrated again to Coimbra, where it has since remained. It was at the beginning of this last period that it reckoned Camoëns (see CAMÕES) among its members. Alone among continental universities to-day, it preserves the mediæval academic dress; and in this, as in its architecture, traditions, and customs, it finds its only rivals in picturesque interest in Oxford and Cambridge. Consult Braga, *Historia da Universidade de Coimbra* (Lisbon, 1892).

COIN'AGE (from Eng., OF. *coin*, wedge, piece of money, from Lat. *cuneus*, wedge; connected with Gk. *κῶνος, kōnos*, cone, Skt. *śāna*, whetstone, from *śā*, to sharpen). Coins are pieces of metal designed to circulate as money, whose weight and fineness are certified by the impressions they bear. These impressions are the symbols of the authority by whose orders the coins are issued, but they also bear an important function in maintaining the integrity of the coin. To insure constancy in the weight of the coin it is necessary to protect it against clipping and against unnecessary wear and tear, or abrasion. The form of the coin is, in itself, a guaranty. Convenience of carriage, as well as greater durability, has given the preference to a rounded, generally a circular, coin over other shapes. Where, as in Japan, we find oblong coins, the corners are generally rounded off. The symmetry of outline guarantees the coin. This is heightened by milling the edges. Raised inscriptions served the same purpose and do so better than incised letters, which are also used. The design upon the face of the coin is usually protected by raised edges, which project as much as the highest part of the design.

The importance of these features of modern coins in maintaining intact the weight of the coin by showing at once any attempted clipping, and by preventing the wearing off of surfaces by use, can best be appreciated by comparing them with the crude, irregular disks from which early coins were made, and the high relief of many of the designs upon them.

Gold and silver were used in settling accounts before coins were invented, but scales were a necessary adjunct of such transactions. Just as gold dust is weighed in the mining regions, so all exchanges effected by the metals before the introduction of coinage involved weighing the metal used. The prevalence of exchange by weight is reflected in the correspondence, at least in their origin, between coins and measures of weight. To go back no further than the origin of English money, it is sufficient to recall that the monetary pound was once a pound weight of silver. This system was derived from the money of Charles the Great, and while in the subsequent development they departed widely from the original source, the monetary systems of modern Europe all trace back to the pound of silver.

The invention of coins, which in classical antiquity seem to have been first used in Lydia, did away in a measure with the necessity of weighing. In the multiplicity of Grecian states coins were numerous, and while this was removed by the Roman Empire, it reappeared with the breaking up of the Empire of Charles the Great. Not only did each nation make its own coins, but, with the disintegration of central authority, nobles and cities usurped this right or had it conferred upon them by feeble monarchs. The multiplicity of coins restricted the area within which they were current. Outside of such areas they had no legal validity; they did not pass by count, but, if at all, only by weight. Certain coins, however, bore such an excellent reputation for uniformity and excel-

lence of workmanship that they acquired an international circulation and passed generally by count or tale. As modern centralized states became strongly rooted, a unification of the coinage took place, and the numerous units disappeared. Improvements in the processes of coinage have made effective the certification of weight and fineness which coinage implies.

The right to coin money is a prerogative of the state and one of the foremost marks of sovereignty. The circulation of coins rests, in the first instance, upon the authority of the state, but that authority must be exercised in good faith. Coinage issued by individuals would lack authority and lack also the guaranty of good faith. There have been occasions of great dearth of money where private persons have issued coins. Such issues are known as tokens and gain circulation either from their similarity to legal coins or from the promise of redeeming them. Their total lack of uniformity gives a picture of what might be expected were the issue of coins left wholly to private initiative. Almost equally obvious is the necessity for the manufacture by the state of the coins which it issues. To delegate the manufacture of its coins to a private establishment, as was done in France before 1879, requires such a minute control of all its operations by state officials that the plan has generally been abandoned. The greater integrity of a national mint over a private enterprise is further illustrated by the fact that the mints of the leading nations are frequently called upon to execute the coinage for smaller states which have no mints of their own. Thus, in 1901, the United States Mint executed a gold coinage for Costa Rica.

The metallic circulation of a country usually consists of standard coins and token coins, with respect to whose issue different rules prevail. The first are those of the standard monetary metal, and their coinage is usually free. This means that such coins are freely issued to individuals who bring bullion to the mint for coinage. There may be a coinage charge or this transformation may be made gratuitously by the state. Gratuitous coinage, which prevails in England and the United States, is favored because it promotes the transformation of bullion into coin to meet the demands of trade. A coinage charge, as in France (7 francs 44 centimes per kilogram of gold, or 3437 francs), is justified on the ground that the value of the coin is greater than that of the bullion by the cost of production; and, further, that the policy of the government should be to give reasonable ease to the transformation, but not to favor a constant oscillation between coin and bullion. The English language knows but one name, seigniorage, for such coinage charges, whether they merely cover the cost of coinage (Fr. *brassage*) or are high enough to involve a profit. High seigniorage charges upon the standard money metal defeat the purposes of free coinage and are no longer customary. See SEIGNIORAGE.

Token coins are those whose metallic value is less than their nominal value. As such coinage involves a profit to the state, the state reserves the right of issue to itself. (See MONEY for an exposition of the principles of such issues.) In the United States this applies to the silver, nickel, and bronze coins. The metallic value of the coin is no protection against its unauthorized issue by individuals, but this protection is secured by the laws punishing counterfeiting. The processes of manufacturing a good counterfeit are so complex and require such heavy machinery that the secret manufacture can hardly escape detection.

Important considerations in coinage legislation, apart from the larger monetary aspects, are to secure uniformity in the coin at its manufacture and to maintain the integrity of the coin in circulation. Absolute accuracy in weight and fineness for every coin issued is out of the question. The law therefore allows, in the manufacture of coin, a certain tolerance both of weight and fineness. Variations within these limits, over or under the standard fixed by the law, do not disqualify the piece from issue. In former days these limits were often set quite wide, and by systematically getting under rather than over the average, considerable profits were stolen from the coinage. This was one of the abuses of the old régime in France which awakened the ire of the legislators of the Revolution when they took the reform of the coinage in hand. It should of course be the object to make these limits as narrow as possible, with the idea that the deviations, one side or the other, should balance, so that for the mass of the coinage the legally established standard should prevail. In the United States the standard fineness for both gold and silver is 900, and no gold ingot showing a greater deviation than one-thousandth, or silver ingot with a greater deviation than three-thousandths, can be used in coinage. As to weight, the rule for single pieces prohibits deviations of more than one-half a grain for the double eagle (516 grains legal weight) or eagle, or more than a quarter of a grain for the half eagle. The law also provides that in "weighing a number of pieces together, when delivered by the coiner to the superintendent, and by the superintendent to the depositor, the deviation from the standard weight shall not exceed one-hundredth of an ounce in $5000 in double eagles, eagles, and half eagles."

Every effort is made, by watching the process of manufacture, to insure the observance of these rules. Trial pieces of every lot of coin which passes through the mints must be reserved. Once a year an Assay Commission is appointed for the examination of these sample pieces, which are both weighed and assayed. The accuracy of the work of the United States mints is shown by the report of the Assay Commission for 1901 that the fineness of gold coins varied from 899.5 to 900.2, the legal limits being 899 to 901, while that of silver coins varied from 898.2 to 900.9, the legal limits being 897 to 903.

In the circulation of coins from hand to hand, the friction gradually wears the impressions off and reduces the weight of the coin. It is, therefore, customary for coinage legislation to determine the point at which the coin loses its legal validity. In the United States gold coins which have lost more than one-half of 1 per cent of their weight in 20 years from date of issue, or proportional amounts for less periods, are legal tender only by weight. All such coins received by the government must be recoined. The depreciation of coins by abrasion has, in earlier times, been a serious problem. By a familiar monetary law (Gresham's Law) full-weight money is always preferred for export, while the worn coin remains at home. If the home circulation is much worn, there is a great temptation to "sweat" all the new coins which come

from the mint for the profit of the transaction. Hence the necessity from time to time of general recoinage of the money in circulation. The government calls in all outstanding coins of certain dates and replaces them with new coins, declaring, moreover, that after a certain date the coins not presented shall lose their legal-tender quality.

In England, coining, although a prerogative of the crown, is regulated by Parliament. By the Constitution of the United States the power of coining money, regulating the value thereof, and of foreign coin is granted to Congress, and the several States are prohibited from coining money as well as from making anything but gold and silver coin a tender in payment of debts. The uttering of spurious coin, therefore, is a crime against the United States. It is also punishable by a State government as a cheat. Coin has been judicially defined as "a piece of metal stamped and made legally current as money." A counterfeit coin is one made falsely in imitation of the genuine, and intended to resemble or to pass for it. The mutilation or debasement of United States coin, as well as the fraudulent importation or use of spurious foreign coin, is a crime under Federal statutes. See COUNTERFEITING.

Consult also *Reports of the Director of the Mint; Coinage Laws of the United States;* Hepburn, *History of Coinage and Currency in the United States* (New York, 1903). See MINT; MONEY; NUMISMATICS; LEGAL TENDER.

COIR (Tamil *kayiru*, cord), or COCONUT FIBRE. The fibre of the husk of the coconut palm. Coir is a corruption of a word meaning "rope." Its manufacture is an important industry, both in England and America. The fibre of the husk is divided into two classes—the ordinary fibre converted directly into mats, and the so-called brush fibre, which lies just under the skin. The latter is packed under great pressure and then shipped to the manufacturer. It is spun by special machinery and produces a perfectly cabled yarn, which is woven into doormats or ordinary yard matting. In 1913 the coir yarn imported into the United States amounted to 7,322,314 pounds, valued at $312,049. The refuse from coir is used for stuffing mattresses, and also in horticulture as a protection against insects for vines and young trees.

COIRE, kwär. See CHUR.

COIT, JAMES MILNOR (1845–). An American teacher, born at Harrisburg, Pa. He received his education at Hobart College and was connected for some time with the Cleveland Tube Works. In 1876 he became master in natural sciences at St. Paul's School, Concord, N. H., of which school he was appointed vice rector in 1904. He engaged in research work at the University of Munich in 1909, and later became head of the Coit School for American boys in Munich. His publications include the following works: *A Manual of Chemical Arithmetic* (1886); *Treatise on the X-Rays and their Relation to Medical and Surgical Sciences* (1897); *Liquid Air* (1899).

COIT, STANTON (1857–). An American leader in the Ethical Culture movement, especially in England. He was born in Columbus, Ohio; studied at Amherst, at Columbia, and at Berlin, where he took the degree of Ph.D.; was head worker of the New York University Settlement, and became an *aide* of Felix Adler in the Society for Ethical Culture. In 1888 he went to London as minister of the South Place Ethical Society. He became president of the West London Ethical Society, preached in the Queen's Road (Bayswater) Ethical Church, and in 1910 was a Labor candidate for Parliament from Wakefield. He was editor of the *International Journal of Ethics* in 1893–1905; did much for the organization of the English ethical societies, especially in compiling *The Message of Man: A Book of Ethical Scriptures* (1902), an *Ethical Hymn Book* (1905), *Responsive Services* (1911), and *Social Worship* (1913); and wrote translations of Gizycki's works on ethics. He published: *Die ethische Bewegung in der Religion* (1890); *National Idealism and a State Church* (1907); *National Idealism and the Book of Common Prayer* (1908); *Woman in Church and State* (1910); *The Soul of America* (1913). See SOCIETIES FOR ETHICAL CULTURE.

COI'TER, VOLCHER (1534–90). A Dutch anatomist, born at Groningen. He studied in France and Italy, where he heard the lectures of Fallopius at Pisa, was city physician of Nuremberg, and later was attached as surgeon to the army of Johann Kasimir, Count Palatine of the Rhine. He is considered one of the founders of the science of pathological anatomy. Numerous anatomical discoveries are credited to him, including that of the superior muscles of the nose. His studies in osteology and myology are partially set forth in the volumes *Tabulæ Externarum et Internarum Humani Corporis Partium* (1573) and *Lectiones Gabrielis Fallopii* (1575), which are also interesting as revealing one of the earliest attempts at an examination of the internal structure of birds. Indeed, his table, *De Differentiis Avium*, included in the latter, is among the first ornithological classifications.

COJUTEPEQUE, kō-hoō'tā-pā'kā. The capital of the Department of Cuscatlán, Salvador, about 20 miles east by north of San Salvador (Map: Central America, C 4). It is situated north of the volcano Cojutepeque and near Lake Ilopango. The city has considerable transit trade. Cojutepeque, for a few years after 1854, when San Salvador was destroyed by an earthquake, was the capital of the republic. Pop., about 10,000.

COKE (probably connected with *cake*). A hard, brittle, porous solid, of a blackish-gray color and more or less metallic lustre. It does not soil the fingers when rubbed and gives no smoke when burning. It absorbs moisture from the air to a very great extent. In general, the operation of making coke consists of expelling by heat the volatile elements of bituminous coal. The residue resulting consists chiefly of carbon, mixed with varying amounts of ash containing sulphur and phosphorus, and is known as coke. In the manufacture of illuminating gas coke is produced as a by-product (see GAS, ILLUMINATING); but this method is inadequate to produce the requisite quality and amount, and the manufacture of coke is itself an industry of great and rapidly increasing importance. Coke, charcoal, and anthracite coal are the fuels most used in metallurgy, and of these coke possesses the advantages and is without the disadvantages of the other two. Its hardness enables it to sustain the weight of furnace charges, and its porosity helps to make it readily combustible. Charcoal is too soft, while anthracite coal, which is in reality a natural coke, is hard enough, but is so dense in structure that its combustion is slow and its calo-

rific energy moderate. The superiority of coke is due to its cellular structure. The walls are hard and vitreous, and the tiny passages between afford free course for the oxidizing gases of the blast furnace. Besides its use in metallurgy, coke is an important fuel in other industrial operations, especially in cities where the emission of smoke from the combustion of bituminous coal is prohibited. It is also adapted for the use of locomotives. In 1899 the Boston and Maine Railroad began using coke as a fuel. Its advantages are that it is smokeless and does not produce sparks, thus decreasing the number of fires caused by the locomotives. Coke is also employed as a filtering material in water and sewage purification, being used extensively for the latter purpose, particularly in English practice.

Not all bituminous coals can be made into coke, and much experiment and research on the part of chemists have been devoted to ascertaining the necessary constituents of a good coking coal. It appears that the coking property of coal is independent of the constituents, such as moisture, fixed carbon, ash, and sulphur, which it contains, and depends wholly upon the relations and volumes of the elements composing the *volatile combustible* matters of the coal. Just what these relations and volumes are has not been definitely shown. In continental Europe, where the manufacture of coke has been very highly developed, only a poor quality of coal is available, and much ingenuity has been expended in constructing furnaces suitable for this inferior grade of material. In America there has been as yet an abundant supply of coal of the very best quality for coking purposes, the supply having been drawn chiefly from the Connellsville coal of Pennsylvania, that from the Warrior basin coal beds of Alabama, the Flat Top-Tug River district, and other mines of West Virginia, and the Pocahontas coal of Virginia. But, with the increasing demand for coke for metallurgical and other purposes, poorer grades of coking coal must be drawn upon.

The preliminary preparation of coal for the manufacture of coke is chiefly a cleansing and separating process. Some of the best coking coal requires no special treatment, but is charged into the coke ovens direct from the mines. It is usually found advantageous, however, to break up the coal into small pieces, in order that the volatile matter may be utilized to the utmost extent. When the coal is not uniform in size, it is found that it cokes unevenly, the finer portion fusing much more rapidly. When there is much slate in the coal, it is necessary to wash it; the slate separating itself from the coal in the process of washing, on account of its greater weight. Fire clay also will be separated and washed out. Before washing, however, it is necessary carefully to sort the coal according to size. Various machines of great efficiency have been devised for crushing, sorting, and washing coal ready for the ovens, which are described in great detail, as are also the different forms of coke ovens, by John Fulton in his *Treatise on the Manufacture of Coke* (Scranton, Pa., 1905). Three general methods have been followed in the process of transforming coal into coke. The first was the primitive and wasteful process, borrowed from the charcoal burners, of *open-air burning*. The coal is simply piled in a rectangular heap on the ground, with longitudinal and vertical flues running through it, in which enough wood is placed to ignite the whole mass of coal. The fire is lighted at the base of the vertical flues and gradually extends through the mass. When the mass ceases to flame, it indicates that the gaseous matter has been expelled, and the fire is partially smothered by covering the heap with fine dust. Last of all, the mass is sprinkled with a hose, the water being at once converted into steam, which permeates the whole mass. This process is called *coking in heaps* and requires from five to eight days.

The second method of making coke, and one which is still largely employed, is in the *beehive oven*, many improvements in its construction having been made from time to time. As late as 1893 all of the 44,201 coke ovens in the United States were constructed on the beehive plan. The chief advantage claimed for it is that it produces from prime coking coals the best quality of metallurgical fuel. A minor advantage is that water is applied to cool it, while the coke is still in the oven, after which the oven heat reduces the amount of moisture in the coke. The great disadvantage of the beehive oven is that, as ordinarily constructed, the valuable by-products—gas, ammonia, and tar—contained in the volatile matter are entirely lost, though in rare instances the burning gases are used to generate heat, light, and power. This oven is not adapted to inferior grades of coal. It derives its name from the dome shape of its interior. It is usually built of stone masonry, on a firm foundation, with its interior lined with specially designed fire brick. The beehive oven is usually about 12 feet in diameter and 6 to 7 feet high in the centre. The coal is charged through a hole in the centre of the roof and is leveled off to an even depth of about 23 inches. The fresh charge is fired by the heat remaining in the walls from the previous charge, and the combustion is supported by air admitted through the front door, over the top of the charge. The volatile matter in the coal is driven off by the heat and burned in the top of the oven, along with a portion of the fixed carbon. The source of heat being at the top, the coking process proceeds downward and is effected by the partial combustion of the charge itself. In England, and in a few American plants, the volatile matter is gathered into a conduit, carried under boilers and burned, to raise steam for pumping water and other purposes; but usually the gases escape directly into the open air and are wasted.

A recent type of oven is rectangular instead of circular in form and so built that the coke may be pushed instead of drawn from the coking chambers. The beehive oven with the partial combustion method has long since been abandoned in Belgium and Germany, and coke is made in retorts as outlined below, where various valuable by-products are saved, and an increased yield amounting to about 15 per cent is obtained.

As early as 1766 attempts were made in Germany to save the by-products from coke ovens. It is now accomplished in the *retort oven*, which was devised in Europe for the double purpose of saving the by-products and of utilizing for coke making inferior grades of coal. Very slow progress was made in developing the process, and it was not until 1883

that it was put upon a paying basis. This was due to the unsatisfactory design of the early coke ovens and to the low price of the by-products, on account of the supply from gas works. In 1856 Knab of France built a group of retort coke ovens which had for their object, in addition to the making of coke, the double purpose of separating the tar and ammonia from the gases generated and of then returning these gases to be burned in the flues to heat the ovens. The principal defect of these ovens was the failure to proportion the several parts to the quality of coal to be coked. This mistake was corrected by Carvès of France in the Knab-Carvès oven of 1873, which has proved a model for later ovens. Coke produced in by-product ovens was regarded with disfavor till Dr. Otto introduced improvements which were patented in 1883 and are embodied in the Otto-Hoffmann coke oven, to which the Siemens regenerator is applied. In 1887 the Semet-Solvay oven for coking dry coals, or a mixture of pitchy and dry coals, came into notice, first introduced into the United States in December, 1893. The Belgian ovens, designed for coking poor grades of coal, are also widely used in Europe.

The retort oven used in the Semet-Solvay process, as now built, is a long, narrow chamber 36 feet 3 inches long, 11 feet 10 inches high, and from 17 to 21 inches wide, depending on the quantity of the coal to be coked. The ovens are built in blocks of from 25 to 34, separated by flues in which gas is burned, the heat from which cokes the coal. The charge is introduced through several openings in the top, the ovens are nearly filled, and then tightly sealed. As the heat in these ovens comes from the sides instead of the top, as in the beehive oven, the flow of gases generated is from the sides to the centre, while the free expansion of the coke is somewhat checked. As a result, some coals that in a beehive oven make a coke that is too soft and spongy for blast-furnace use are hardened and strengthened in the retort oven so that they are able to bear the furnace burden. The ovens being so much narrower, the process of coking requires only half as much time as in the beehive furnace. When the charge is coked, it is pushed out by means of rams through doors at each end, the doors are immediately closed, and the oven is ready for a recharge with almost no loss of heat. The coke is quenched as soon as it leaves the oven. The gases are conducted from the oven, through an opening in the top, into a collecting main. This is a hydraulic main, like that used in illuminating-gas works. The gas bubbles through the water, and a part of the tar and ammonia is condensed and separated as the gas cools, and then collected. The gas next passes through tubular condensers, where it is cooled by contact with a series of tubes through which cold water is flowing. During this process more ammonia and tar are condensed. The gas now goes through an exhauster, and, last of all, to a scrubbing apparatus, where the last traces of tar and ammonia are removed. The gas is now returned to be burned in the flues of the coke oven; but as this consumes little more than half of that generated, the rest is available for other purposes. The tar is collected into tanks, and the ammonia is concentrated into a strong crude liquor or into sulphate of ammonia. A ton of coal will yield from 15 to 25 pounds of sulphate and from 5 to 14 gallons of tar.

In Germany 12,000 Otto-Hoffmann coke ovens are in operation, of which 400 save the by-products. The Otto-Hoffmann oven has been even more widely introduced into the United States in recent years. In its most recent form, the Schniewind modification, it combines the regenerative principle of developing the heat with uniform underfiring for distribution of the heat required for the coking of the charge in the oven.

In 1908 the first plant of Koppers's regenerative ovens, where the retorts are heated by vertical flues, were built by the Illinois Steel Company at Joliet, Ill., and in 1911 and 1912 there were installed 560 ovens of this type at the Gary, Ind., plant of the United States Steel Corporation.

In addition to the by-product coke ovens, there are now running in the United States a number of establishments making gas in so-called vertical retorts. In these retorts another type of coke is produced, harder than the old-fashioned gas coke and yet softer than the beehive-oven coke. This is a very desirable coke for domestic fires, such as cooking, furnace, hot-water, and steam-heating.

At the close of 1912 there were in the United States 5211 by-product coke ovens, and 793 were building. These were divided as follows: United-Otto, including Otto-Hoffmann and Schniewind types, 2100; Semet-Solvay, 1443; Rothberg, 287; Koppers, 1215, and Klönne, 22. In 1912 the total production of by-product coke in the United States was 11,115,164 short tons, valued at $42,632,930, while the beehive coke amounted to 32,868,435 short tons, valued at $69,103,766, thus giving a total of 43,983,599 tons, valued at $111,736,696.

The accompanying table gives the yield in coke and other products of certain standard coals:

YIELDS OF VARIOUS COALS IN OTTO-HOFFMANN OVENS

	Coke, per cent.	Tar, per cent.	Sulphate, per cent.	Total gas per 2000 pounds, cubic feet.
AVERAGE OPERATING RESULTS				
Everett, Dominion coal	72.83	4.99	1.010	About 9,000
Glassport, Youghiogheny coal	75 60	5 07	1.100	" 9,000
Germany, Westphalian coal	74.50	3 70	1.280	" 9,600
DISTILLATION TESTS				
Connellsville coking coal	76.34	6 14	1.223	" 8,924
Pittsburgh coking coal	68.25	4.38	.908	" 8,884
Eastern Pennsylvania coking coal	85.00	2.00	.800	" 8,400
Virginia coking coal	66.01	4.70	1.070	" 10,090
Kanawha coking coal	73.60	6.40	1.000	" 10,289

Bibliography. Consult "Mineral Resources of the United States," in the *Annual Reports of the United States Geological Survey;* Platt, "Special

Report on Coke Manufacture," *Pennsylvania Second Geological Survey Report of Progress L* (Harrisburg, 1876); Weeks, "Coke," in *United States Census Office Eleventh Report on Manufacturing Industries* (Washington, 1895); Schniewind, *Manufacture of Coke in the United States: The Mineral Industry* (New York); Fulton, *Coke: A Treatise on the Manufacture of Coke and the Saving of By-Products* (2d ed., Scranton, 1905). See AMMONIA; GAS; TAR.

COKE, kụk *or* kōk, SIR EDWARD (1552–1634). A distinguished English lawyer and judge, born at Mileham, in Norfolk, on Feb. 1, 1552. Educated at the free grammar school at Norwich, and at Trinity College, Cambridge, he passed thence to Clifford's Inn and subsequently to the Inner Temple to study law, and was called to the bar in April, 1578. His great ability, legal learning, and the tact he exhibited in the conduct of his cases, secured him a large practice on the very threshold of his career. In 1586 he was appointed recorder of Norwich, in 1592 recorder of London, a position he resigned the same year for the solicitor-generalship. In the following year he was elected member of Parliament for the County of Norfolk and was chosen Speaker of the House of Commons. In 1594 he was made Attorney-General, and it was in this capacity that he conducted the prosecution in the famous state trials of Southampton and Essex in 1601, of Sir Walter Raleigh in 1603 (in which he exhibited a brutal rancor and bitterness), and of the Gunpowder plotters in 1605. He held this office until 1606, when he was appointed Chief Justice of the Court of Common Pleas, the duties of which position he discharged in a manner that secured for him a great reputation. Upright and independent, with a high notion of the dignity and importance of his office, he did not, in an age of judicial sycophancy, hesitate to oppose any illegal encroachment by royalty. At the suggestion of Bacon (between whom and Coke there was a long-standing hostility), James I, in order to bring him over, appointed Coke, in 1613, Chief Justice of the King's Bench, and shortly afterward Privy Councilor. But here he proved equally incorrigible, among other things maintaining, in the Commendams case, that the King had no power to stay the proceedings in a court of justice, even after his more pliable colleagues had retracted and begged the royal pardon on their knees for having entertained and expressed that opinion. As a consequence of this unflinching assertion of the supremacy of the law of the land, Coke was (November, 1616) relieved from his chief-justiceship. His ardent and unflinching support of liberal measures in Parliament, especially of the right of freedom of debate, soon brought him into further trouble with the court party, and in 1621–22 he suffered nine months' imprisonment in the Tower. In the third Parliament of Charles I (1628) Coke took an active part in framing the celebrated Petition of Right, and it was in a great measure owing to his advocacy that the Lords were induced to agree to it. He died Sept. 3, 1634. He had an extraordinary popularity, and his utterances and courage did much to contribute to the final result in the struggle between the crown and the commons. Yet he was of an intolerant disposition, and in religious matters and in his fear of the growth and influence of the papal power he was fanatical. He is now best known for his law treatise, *Coke upon Littleton; or, the First Institute,* a work of extraordinary learning and of great acumen, which is still, perhaps, the most influential and authoritative treatise on English law. His other works are the *Second, Third, and Fourth Institutes, The Complete Copyholder,* and *Reading on Fines;* while his collection of law reports, which made an epoch in the history of law on their appearance, are still of great value to the profession. Consult: Johnson, *Life of Sir Edward Coke* (2d ed., London, 1845), which is somewhat untrustworthy; also Woolrych, *The Life of Sir Edward Coke* (London, 1826); and the sketches of his life in Foss, *Judges of England,* vol. vi (London, 1857), and in Campbell, *The Lives of the Chief Justices of England,* etc., vol. i (London, 1849).

COKE, THOMAS (1747–1814). The first Bishop of the Methodist Episcopal church. He was born at Brecon, Wales, was educated at Oxford, and took orders in the Church of England in 1770. About 1772 he was converted and showed great fervor; in 1776 he met Wesley for the first time and after that began open-air preaching. In consequence of his revivalism he was dismissed from his curacy of South Petherton and attached himself to the Methodist Society. In 1782 he was appointed president of the Irish Conference, and two years later he was made superintendent for America, with power to confer ordination, by the laying on of hands administered by John Wesley and two other clergymen of the Church of England. Charles Wesley, who had not been aware of the ceremony and heartily disapproved of it, wrote the well-known epigram:

> So easily are bishops made
> By man's or woman's whim;
> Wesley his hands on Coke hath laid,
> But who laid his hands on *him?*

In 1787 both Coke and Asbury, whom Coke had ordained, assumed the title of Bishop, much to John Wesley's displeasure. They traveled together among the various conferences until the middle of 1785, when Coke returned to England. He made in all nine visits to America and spent the rest of his life in active missionary work, in personal visitation in the United Kingdom and in America, and in the encouragement of enterprises for the Christianizing of Asia and Africa. After Wesley's death Coke was secretary of the British Conference, and, with Asbury, he edited *The Doctrine and Discipline of the Methodist Episcopal Church of America* (1787). In 1813 he applied unsuccessfully to Lord Liverpool and William Wilberforce to be appointed Bishop for India. He was consumed with a desire to spread Christianity in India, and as the government was unfavorable to missions by Dissenters there, he believed he could work more effectively in connection with the Church of England, to which, like many Methodist ministers, he himself belonged. In the same year (1813) he sailed for Ceylon, but died of apoplexy on the voyage, May 3, 1814. He was of a very energetic disposition and of remarkable executive abilities. He had the advantage of considerable personal means, which he spent freely in the cause. Among his works are a *Life of John Wesley* (1792); a commentary on the Scriptures (6 vols., 1803–08); *History of the West Indies* (3 vols., 1808–11). For his life, consult Etheridge (London, 1860) and Upham (New York, 1910).

COKES, BARTHOLOMEW. A simpleton in Jonson's *Bartholomew Fair.*

COL, kôl (Fr., neck). In geography, a marked depression or pass in a mountain range. In those parts of the Alps where the French language prevails, the passes are usually named *cols;* hence the Col de Balme, the Col du Géant, etc.

COLADA, kō-lä′dȧ. One of the two swords of the Cid, taken from the Count of Barcelona.

COLA NUT, or **KOLA NUT.** The seed—not properly the nut—of *Cola acuminata*, a large tree of the family Sterculiaceæ, native to western tropical Africa, cultivated in the West Indies, Brazil, and other tropical countries, where it has to some extent become naturalized. The seeds average about an inch in length, are brown or reddish gray, slightly mottled, have an odor resembling nutmeg, and a bitter flavor when fresh, which becomes mildly aromatic with age. In the tropics, especially in the Sudan, where they are known as guru nuts, they are employed as a stimulant and as a remedy for tropical diarrhœa. The nuts contain from 0.7 per cent to 2 per cent of alkaloid caffeine (q.v.) and small amounts of tannin and theobromine. According to Knebel and to Hilger, fresh cola nut probably contains no caffeine at all, but a glucoside, the fermentative decomposition of which yields caffeine, glucose, and cola red.

COLBAN, kōl′bȧn, Adolphine Marie (1814–84). A Norwegian novelist, whose literary genius was developed late and by necessity. She was born in Christiania, Dec. 18, 1814. Left a widow without resources in 1850, she went to Paris, where a friend published part of her correspondence as *Lettres d'une barbare.* These were received with such favor that she was led to try fiction, and between 1869 and 1881 published seven volumes of tales, most of which were translated into German. *Jeg lever* ('I live') (1877) is the most characteristic, but nearly all are charming for their sympathetic insight into Norwegian character.

COLBERG, kōl′bĕrK. See Kolberg.

COLBERT, kôl′bâr′, Jean Baptiste (1619–83). A French statesman, Minister of Finance under Louis XIV. He was born at Rheims, Aug. 29, 1619, and served his apprenticeship in a woolen draper's shop. He afterward went to Paris and soon obtained a position in the War Office, where his tireless activity brought him into notice. He became secretary to Le Tellier, then at the head of the War Office, and through his influence was made a counselor of the King and introduced to Mazarin, who soon employed him in important affairs of state. On his deathbed Mazarin recommended Cŏlbert to the King, who in 1665 appointed him Comptroller General of the Finances. Colbert found the finances in a ruinous condition and immediately entered upon an elaborate programme of reform. Fouquet, the Superintendent of Buildings under Mazarin, was found guilty of maladministration and was imprisoned for life. The new Comptroller instituted a council of finance and a chamber of justice, to call to account the farmers of the state revenues, who were forced to yield up all the wealth of the crown of which they had fraudulently possessed themselves. In 20 years the revenue rose to 116,000,000 livres, of which but 23,000,000 were spent in collection and administration, whereas before Colbert took the finances in hand the revenue had amounted to only 84,000,000 livres, of which 52,000,000 were absorbed in collection. Colbert did not rest satisfied with being a financial reformer, but in various ways developed the industrial activity of the nation by state support. He was created Minister of Marine in 1669, and shortly afterward he acquired control of commerce, the colonies, and the royal expenditure. French trade was extended, and roads and canals, including the great canal of Languedoc, were built. Certain features of his economic policy, such as a too stringent regulation of commerce, high protective duties, and the maintenance of the corporation system, have been frequently criticized, but they were rather the faults of the age than of the man. He organized anew the colonies in Canada, Martinique, and Haiti, and founded those of Cayenne and Madagascar. To encourage trade in the Levant he granted special privileges to traders in imitation of the East India Company scheme, but, owing to his high protective tariffs and rigid regulations, failure followed his efforts.

Perhaps the most successful of all Colbert's reforms was the creation of a French navy. He found France in 1669 with a few old hulks and provided her in three years with a fleet of 60 ships of the line and 40 frigates. The mercantile marine was also developed, and bounties were given on ships built in France. Colbert revised the Civil Code, introduced a code of marine law, as well as the so-called *Code Noir* for the colonies. Statistical tables of the population were first made out by his orders. Men of learning and genius found in him a generous patron. The academies of inscriptions, science, and architecture were founded by him. In short, he appears as the promoter of industry, commerce, art, science, and literature—the founder of a new epoch in France. Notwithstanding his remarkable ingenuity, the unbounded extravagance of his master forced him to raise money in ways objectionable to his reason, and to maintain war taxes in time of peace. The last years of his life were a constant struggle to find money for Louis's ruinous wars, and he died Sept. 6, 1683, bitterly disappointed because his great services were but ill appreciated by the King, whose confidence in Colbert had been undermined by the favorite Louvois. The people of Paris, enraged at the oppressive taxes, would have torn his dead body to pieces but for the intervention of the military and his burial by night. He left large estates in France, and some of his offices descended to his sons, one of whom became Minister of Marine and another Superintendent of Buildings. A third was made Archbishop of Rouen. It is not the least of Colbert's merits that he saw the wisdom of Richelieu's tolerant course towards the Huguenots and restrained the King from that fatal policy of persecution which began with the revocation of the Edict of Nantes (q.v.) soon after the great Minister's death. Nevertheless, he ruled with an iron hand, and even to his friends he was known as the "man of marble." The coldness of his nature is well caught in the epithet of Madame de Sévigné, who styles him "The North." Among Colbert's posthumous papers were found *Mémoires sur les affaires de France* (c.1663), and a fragment, *Particularités secrètes de la vie du Roy,* which have been published several times.

Consult: Clément, *Vie de Colbert* (Paris, 1846); id., *Lettres, instructions, et mémoires de Colbert* (9 vols., ib., 1861–82); id., *Histoire de Colbert et son administration,* ed. by Mademoiselle Clément (ib., 1874); Gourdault, *Colbert, ministre de Louis XIV* (Tours, 1885);

Lavisse, *Histoire de France*, vol. vii, part i (ib., 1905). Sargent, *Economic Policy of Colbert* (London, 1899), contains a bibliography of works relating to Colbert and his time. See FRANCE; LOUIS XIV.

COLBERT, JEAN BAPTISTE, MARQUIS DE SEIGNELAY (1651–90). A French statesman, Minister of Marine, and son of the famous Minister of Finance. In 1683 he succeeded his father as the head of the navy. He led a naval expedition against Genoa in 1684. If his advice had been taken after the battle of Beachy Head, the French fleet might easily have won control of the channel. Consult Clément, *Le Marquis de Seignelay* (Paris, 1887).

COLBURN, kōl'bûrn, WARREN (1793–1833). An American mathematician, born in Dedham, Mass. He graduated at Harvard in 1820 and in the same year opened a private school in Boston. In 1821 he published *First Lessons in Intellectual Arithmetic*, the sale of which far exceeded that of any previous mathematical work. It was translated into many foreign languages. From teaching, Colburn went into manufacturing and was superintendent of large establishments in Waltham and Lowell; but much of his time was devoted to lecturing on commerce, natural history, physics, and astronomy. He published a *Sequel* to his arithmetic (1822), and an *Algebra* (1827).

COLBY, ALBERT LADD (1860–). An American metallurgist, born in New York City. He was educated at the College of the City of New York and at the Columbia School of Mines. After 1886 he was engaged as a specialist in steel metallurgy. In 1897 he became secretary of the Association of American Steel Manufacturers, and in 1904 he was iron and steel commissioner at the St. Louis Exposition. Besides several technical papers he is author of *American Standard Specifications for Steel* (1902).

COLBY, CHARLES CARROLL (1827–1907). A Canadian statesman. He was born at Derby, Vt., and graduated from Dartmouth College in 1847. He was called to the bar in the Province of Quebec in 1855 and for some years practiced law in Stanstead, but abandoned it for industrial and mining pursuits. In 1867, the year of confederation, he was elected Conservative member for Stanstead in the House of Commons and represented that constituency until 1891. In 1887–89 he was Deputy Speaker of the House, and in 1889–91 he was President of the Privy Council in the administration of Sir John A. Macdonald. During his extended parliamentary term he became one of the ablest debaters in the House and was one of the earliest advocates of the protective or national policy adopted in 1878. He published *Parliamentary Government in Canada* (1886), a work highly praised by Alpheus Todd (q.v.), an authority on British constitutional law. His eldest son, CHARLES WILLIAM COLBY (1867–), was Kingsford professor of history in McGill University in 1895–1910 and published *The Sources of History* (1899) and *Canadian Types of the Old Régime* (1908).

COLBY, EVERETT (1874–). An American lawyer and political leader, born in Milwaukee, Wis. He graduated at Brown University in 1897 and was admitted to the New York bar in 1899. He served in the New Jersey House of Assembly in 1903–05 and, although opposed by the political "machine" of the State, became a member of the State Senate for the term of 1906–09. In 1913 he was the candidate of the Progressive party for Governor of New Jersey.

COLBY, FRANK MOORE (1865–). An American editor and writer, born in Washington, D. C. He graduated from Columbia University in 1888, was acting professor of history at Amherst College in 1890–91, lecturer on history at Columbia and instructor in history and economics at Barnard College from 1891 to 1895, and professor of economics at New York University thereafter until 1900. From 1893 to 1895 he was a member of the editorial staff of *Johnson's Cyclopædia* in the department of history and political science, and in 1898 he became editor of the *International Year Book* and one of the editors of the *International Cyclopædia*. He was one of the editors of the first edition (1900–03) of the NEW INTERNATIONAL ENCYCLOPÆDIA and of the second edition (1913–15); served as American editor of *Nelson's Encyclopædia* (1905–06); and after 1907 edited the *New International Year Book*. His other literary work comprises editorial writing for the New York *Commercial Advertiser* (1900–02), "The Book of the Month" in the *North American Review* (1913–), as well as critical articles for the *Bookman* and other magazines, and *Outlines of General History* (1900), *Imaginary Obligations* (1904), and *Constrained Attitudes* (1910).

COLBY, HARRISON GRAY OTIS (1846–). An American naval officer, born at New Bedford, Mass. After graduating from the United States Naval Academy in 1867 he was promoted through the various grades, becoming captain in 1902 and rear admiral in 1908. He served on the *Dakotah* during the Civil War and commanded the *Hannibal* in the Spanish-American War. In 1904–05 he commanded the European squadron. He retired in 1908.

COLBY, THOMAS FREDERICK (1784–1852). An English engineer connected with the British Ordnance Survey for 45 years. He invented the "compensation bar," used in base measurements. In 1824 he planned, and from then until 1846 supervised, the survey of Ireland. Consult Portlock, *Memoirs of the Life of General Colby* (London, 1869).

COLBY COLLEGE. An institution of higher education, founded by the Baptists of the District of Maine, at Waterville, Me. It was chartered by the Legislature of Massachusetts in 1813 and was known as "The Maine Literary and Theological Institution" until 1820, when its name was changed to Waterville College. In 1867 the name was again changed to Colby University, in honor of Gardiner Colby, whose gifts to the college amounted to $200,000. The name was changed in 1899 to Colby College. The principal college buildings include Memorial Hall, Champlin Hall, Foss Hall, North College, and South College. Colby College offers courses leading to the B.A. degree, without requiring Greek for entrance, and courses leading to the B.S. degree. Men and women are admitted on equal terms and pursue the same studies; in the required courses they recite separately. The courses are largely elective after the first year. The library in 1914 had 50,000 volumes and 20,000 pamphlets. The number of students was 425. The endowment funds amounted to $600,000, and the value of college property to $500,000. The president in 1914 was A. J. Roberts, A.M.

COLCHAGUA, kōl-chä'gwȧ. A province of Chile, bounded on the north by the provinces of Santiago and O'Higgins, on the east by Argentina, on the south by the Chilean Province of Curicó, and on the west by the Pacific (Map: Chile, C 10). Area, 3856 square miles. The eastern and western parts are traversed by the Andes and the Coast Range respectively, while the middle section forms a part of the central valley of Chile, the best-cultivated part of the country. The soil is well watered and of exceptional fertility, yielding corn, wheat, oats, and beans. Cattle raising is carried on extensively. The province is traversed by the Santiago-Valdivia Railway. Pop., 1895, 157,566; 1907, 159,119; 1910, 159,421. Capital, San Fernando.

COLCHESTER, kōl'chĕs-tẽr. A parliamentary and municipal borough and river port of Essex, England, on the south bank of the Colne, 12 miles from the sea and 51 miles northeast of London (Map: England, G 5). It is partly surrounded by the remains of an old Roman wall. The most notable building is the castle erected in the reign of William Rufus, with walls from 10 to 30 feet thick, of which the Norman keep is said to be the largest in England. The ruins of St. Botolph's Priory are also Norman. The streets are well paved and lighted by electricity, supplied by the town, which also owns the water supply. The castle contains a museum of antiquities and a library. A gateway of the former monastery of St. John has been restored. The town maintains baths, recreation grounds, and markets. Its educational institutions include the Albert School of Science and Art and a public library. The city owns the oyster fishery at the mouth of the Colne, and it is a great source of revenue. Its corn markets are important, and its manufactures include boots, shoes, and woolen ware. It has a quay for vessels of 150 tons at the suburb called "Hythe." Pop., 1901, 38,373; 1911, 43,463. Colchester is the *Camulodunum* of the British and Romans and the later *Colneceaster* (Colne Castle) of the Saxons. Many Roman remains have been found here, bushels of coins of many emperors, vases, urns, lamps, pavements, and baths. The town was ravaged by the plague in 1348, 1360, and 1665. In the Civil War, Colchester held out for the King, but was captured by General Fairfax after a three months' siege. Old King Cole, according to the legend, gave the town its modern name. Consult: Cutts, *Colchester* (London, 1889); Round, "Colchester during the Commonwealth," in *English Historical Review*, vol. xv (ib., 1900); Benham, *Red Paper Book of Colchester* (Colchester, 1902); id., *Oath Book of Colchester* (ib., 1907).

COLCHESTER. A town in Chittenden Co., Vt., containing the village of Winooski (Map: Vermont, B 3). Winooski is a manufacturing village, 2 miles from Burlington, on the Central Vermont Railroad. It contains a public library and has a large plant of the American Woolen Company, cotton mills, machine shops, brickworks, large screen works, butter factory, lumber and cider mills, etc. Pop. (Winooski village, 1900, 3783); town, 1900, 5352; 1910, 6450.

COLCHESTER, first BARON. See ABBOT, CHARLES.

COL'CHICINE (Fr., from Lat. *colchicum*, Gk. *κολχικόν, kolchikon*, the poisonous meadow saffron, from Gk. Κολχίς, *Kolchis*, a country on the Black Sea), $C_{22}H_{25}NO_6$. A bitter alkaloid, the active principle of colchicum root, the corm of *Colchicum autumnale* (Linné), growing in southern and central Europe. It is a crystalline substance, soluble in water, alcohol, and chloroform. Colchicum preparations are used in medicine to relieve pain in gout. In larger doses colchicine is poisonous, and even in medicinal doses may act as a powerful gastro-intestinal irritant and heart depressant, in which case its administration must be temporarily discontinued. The medicinal dose of colchicum root, which contains about 0.5 per cent of colchicine, is from 2 to 8 grains, in powder. The dose of colchicum seed, which contains less of the alkaloid than the corm, is from 1 to 5 grains. Colchicine itself may be extracted from colchicum seed, with water, alcohol, and chloroform, by a somewhat lengthy process. It is a bitter, yellow, rubber-like substance, very soluble in cold water, but less readily in hot water, and extremely soluble in alcohol and chloroform. With chloroform it also forms a fairly stable chemical compound. It is optically active, turning the plane of polarized light to the left. See ALKALOIDS.

COLCHICUM, kōl'kĭ-kŭm (Lat., from Gk. *κολχικόν, kolchikon*, the poisonous meadow saffron). A genus of plants of the family Liliaceæ, native to Europe and to the Mediterranean region. The species, of which there are about 30, are stemless, with flowers half subterranean like the crocus, only the limb of the perianth and part of the tube rising above ground. The flowers much resemble crocus flowers. The only British species is *Colchicum autumnale*, the meadow saffron, sometimes also, but incorrectly, named "autumn crocus," which is plentiful in meadows and pastures in some parts of England and of the continent of Europe. The flowers are pale purple; they appear in autumn unaccompanied by any leaves; the leaves, which are large and broadly lanceolate, appear in spring, when the stalk which bears the ripening fruit rises among them. The whole plant is very acrid and poisonous, chiefly owing to the presence of colchicine. Cattle are not infrequently injured by it in pastures where it abounds. It is, however, not difficult to extirpate, the repeated pulling of it by hand, as it appears above ground, being sufficient for this purpose; the roots soon become exhausted and die. It is a valuable medicinal plant, the parts chiefly used for medicinal purposes being the corm (popularly called the root) and the seeds. The seeds are round, brown, and rather larger than mustard seed; and fatal accidents have occurred from their poisonous nature. Other species of *Colchicum* appear to possess similar properties. (See COLCHICINE.) *Colchicum autumnale* is common in flower borders, and a number of other species are employed in the same manner. Most of the species are autumn blooming, a few flowering in spring along with the crocuses, snowdrops, etc. *Colchicum luteum* is one of the finest of spring-flowering species, and *Colchicum parkinsoni, Colchicum speciosum*, and *Colchicum autumnale* of autumn-blooming species. For illustration, see Plate of CORNFLOWER.

COLCHIS, kōl'kĭs (Lat., from Gk. Κολχίς, *Kolchis*). In ancient geography, a region on the east coast of the Pontus Euxinus, or Black Sea, situated north of Armenia and south of the Caucasus. It corresponded very nearly to the Russian Province of Kutais. It was celebrated in the very earliest times as the country of

Medea (q.v.), and was the goal of the Argonauts (q.v.). It was afterward better known to the Greeks as the seat of some colonies of the Milesians. It was noted for its wine and fruits. The Colchians seem to have differed ethnologically from their neighbors, which led Herodotus to argue that they were descended from the Egyptian invaders under Sesostris (q.v.). Darius Hystaspes made them tributary to Persia; subsequently they threw off their allegiance and were ruled by kings of their own; the country then came, nominally, under the dominion of Mithridates, King of Pontus; after Mithridates was defeated by Pompeius, there were princes of Colchis dependent on the Romans. The principal town was Dioscurias (called under the Romans Sebastopolis and now Iskuriah); the principal river was the Phasis, now the Rion.

COL'COTHAR. See IRON, *the Oxides of.*

COLD. See CATARRH.

COLDBATH FIELDS PRISON (named from *Coldbath Fields*, Middlesex). A London jail, erected in the time of James I and sometimes referred to as the English Bastille. It is mentioned as the meeting place of the rioters in Dickens's *Barnaby Rudge* The prison became inadequate and was closed in 1886.

COLD CREAM. A term applied to preparations of fatty substances, which are used as mild and cooling dressings for the skin. The composition of an excellent cold cream is as follows: spermaceti (125 parts); white wax (120 parts); expressed oil of almonds (600 parts); strong rose water (190 parts); and sodium borate (5 parts). Cold cream softens the skin and promotes the healing of wounds and of chapped hands.

COLDEN, kōl'den, CADWALLADER (1688–1776). A Scottish-American naturalist and politician, born at Duns, Scotland. He graduated at the University of Edinburgh in 1705, came to America in 1708, practiced medicine for 10 years in Philadelphia, and then, in 1718, settled in New York City. He was the first surveyor-general of the Colony of New York, was a member of the Provincial Council, and in 1761 was appointed Lieutenant Governor, which office he held until his death. As the governors were often changed, Colden was frequently called upon to act as chief executive and in this capacity came into conflict upon many occasions with the radical element of the "patriot" party, and in 1765 he was burned in effigy by an angry mob because of his support of the Stamp Act. He devoted much attention to the study of the sciences, especially botany, furnished Linnæus with descriptions of several hundred American plants, and was the first to introduce the Linnæan system of classification into America. He published a *History of the Five Indian Nations of Canada* (1727; reprinted, 1905), a work of great value, and a less important work on *The Principles of Action in Matter* (1752). Consult Alice M. Keys, *Cadwallader Colden, a Representative Eighteenth-Century Official* (New York, 1906).

COLDEN, CADWALLADER DAVID (1769–1834). An American lawyer and politician. He was born near Flushing, L. I., and was a grandson of Cadwallader Colden. He studied law and attained considerable eminence at the New York bar. In the War of 1812 he was a colonel of volunteers. In 1818 he was chosen to the State Assembly and in the same year succeeded De Witt Clinton as mayor of New York City. He was elected to Congress in 1821 and from 1824 to 1827 was a member of the State Senate. Colden was one of Clinton's strongest supporters in the work of internal improvements and was conspicuous in the cause of public education, the reformation of juvenile offenders, and other matters of moral and social betterment. He wrote a *Life of Robert Fulton* (1817); *Vindication of the Steamboat Right Granted by the State of New York* (1819); *Memoir of the Celebration of the Completion of the New York Canals* (1825).

COLD FRAME. See FRAME.

COLD HARBOR, BATTLE OF. One of the most sanguinary battles of the Civil War in America, fought June 1 and 3, 1864, at Cold Harbor, Va., about 10 miles northeast of Richmond, between the Federal Army of the Potomac, numbering about 102,000, under General Grant, and the Confederate Army of Northern Virginia, numbering about 65,000 under General Lee. After fighting the battles of the Wilderness and Spottsylvania (qq.v.), Grant proceeded towards Richmond, crossed the Pamunkey on May 28, and on June 1 found himself again face to face with General Lee. On the afternoon of May 31 the Federal general, Sheridan, with his cavalry, carried a position known as Old Cold Harbor, and held it, in spite of the stubborn attacks of the Confederate general, Fitzhugh Lee, until night. On the following day he was relieved by General Wright with the Sixth Corps of the Army of the Potomac and Gen. W. F. Smith with the Eighteenth Corps of the Army of the James, who at 6 P.M. attacked Lee with great vigor in face of a terrible fire and, with a loss of about 2000, succeeded in capturing a large part of the first line, the Confederates making a counter assault, but with little effect, on the position of the Federal Fifth Army Corps under General Warren. Confederate attacks during the night failed to alter the relative positions of the two armies, and the following day was spent in readjusting the Federal lines, Warren remaining on the right, Hancock moving to the left of the Sixth Corps, and Burnside taking up a position in reserve at Bethesda Church. At about 4.30 A.M. on the 3d an assault was made "all along the line," the Federals fiercely attacking the impregnable intrenchments of the Confederates, but being driven back with terrific loss in less than 30 minutes. Most of the fighting ceased within an hour, the Federals having made comparatively little impression on the defenses, but having advanced their lines somewhat closer to the Confederate works. In their brief charge the Federals lost in killed, wounded, and missing fully 7000 men, more probably falling in the first 10 minutes than in any other similar period throughout the war. General Hancock's corps suffered most severely. The two armies remained in their positions until the 12th, when Grant began his march for the James River. (See PETERSBURG.) The total loss sustained by the Federals during these 12 days, but chiefly on the first and third, was fully 12,700; while that of the Confederates, though never accurately ascertained, probably did not exceed 2500. For several days after the attack of June 3 great numbers of dead and wounded lay wholly unattended to between the two lines, Grant and Lee being unable to agree upon any plan for furnishing the needed relief. The battle con-

siderably discouraged the Army of the Potomac, whose loss had not been atoned for by any corresponding gain; and military critics are almost unanimous in the verdict that the assault was the great mistake of Grant's career. General Grant himself afterward said of it: "Cold Harbor is, I think, the only battle I ever fought that I would not fight over under the circumstances" (Young, *Around the World with Grant*, vol. ii, p. 304, New York, 1879), and, "I have always regretted that the last assault at Cold Harbor was ever made" (*Memoirs*, last ed., vol. ii, p. 171). The battle of Gaines's Mill (q.v.) was fought in 1862 nearly on the site of that of Cold Harbor. Consult: *Personal Memoirs of U. S. Grant* (last ed., New York, 1895); Humphreys, *The Virginia Campaign of 1864 and 1865* (New York, 1883); Johnson and Buel (eds.), *The Battles and Leaders of the Civil War*, vol. iv (New York, 1887).

COLD HARBOUR. An old London edifice near the Thames, once the property of a line of wealthy merchants, purchased about the middle of the sixteenth century by the Earl of Shrewsbury and renamed Shrewsbury House. It was soon afterward torn down, and the small buildings erected on its site became a place of refuge for debtors and bad characters.

COLDING, kōl'dĭng, LUDWIG AUGUST (1815–88). A Danish engineer and physicist. He was born at Arnakke, studied at the Polytechnic Institute of Copenhagen, and was appointed a professor there in 1865. He also became connected with the water system of Copenhagen, in 1847 as inspector and in 1858 as an engineer, and in 1865 was appointed professor in a polytechnic school. In addition to many contributions to the *Reports* of the Scientific Society of Copenhagen and to scientific journals, he published *Tropical Cyclones* (1871) and other works.

COLD LIGHT. A term applied to the illumination produced by apparatus, invented by C. F. Dussaud, whereby a rapid succession of illuminated incandescent lamps takes the place of a single source of light. It consisted essentially of a wheel on the circumference of which a number of tungsten lamps were placed, connected, each one in turn, to a source of electricity. By the rotation of the wheel each lamp at a particular point on the wheel was in turn illuminated and cut off from the supply, the speed of rotation of the wheel making it possible to light any one lamp for an exceedingly short interval, the succeeding lamps furnishing, in turn, a source of illumination. There was produced on the retina of the eye of the observer the impression of a continuous luminous source. This being so, Dussaud operated his machine at such a rate that the period of darkness for any lamp was more than twice the duration of its brightness, and it was possible, therefore, he found, to apply a much higher voltage than that at which the lamp was rated. Furthermore, the short period of time during which the lamp is luminous allowed the development of a very small amount of heat, measurable, of course, yet so small as to be unobjectionable; hence the title "cold light." Tests have shown that with from 50 to 160 watts applied to 16 lamps ranging from 25 to 80 candle power, there was obtained a brightness equal to from 250 to 800 candle power for several hours continuously. It will be at once understood that such an arrangement, in connection with a moving-picture machine, allows the latter to be run at any desired speed and even to be stopped without danger of igniting the film; and as regards the intrinsic brightness of the source of light, it has been shown that pictures projected on a screen 15 feet square in a perfectly satisfactory manner involve the consumption of only 150 watts of energy.

COLD SPRING. A village in Putnam Co., N. Y., 6 miles south of Newburgh, on the New York Central and Hudson River Railroad, and on the Hudson River opposite West Point (Map: New York, A 2). It has two foundries and embroidery works. Pop., 1900, 2067; 1910, 2549.

COLD SPRING. A village in Putnam Co., summer resort in Suffolk Co., N. Y., 32 miles by rail east of New York City, on Cold Spring Harbor, an inlet of Long Island Sound and on the Long Island Railroad. It is noted for its fine scenery and contains an extensive trout hatchery, public library, station for experimental evolution of the Carnegie Institution of Washington, and laboratories of the Brooklyn Institute. Pop., 1914, about 750.

COLD'STREAM. An historical border village of Berwickshire, Scotland, on the left bank of the Tweed, 15 miles southwest of Berwick (Map: Scotland, F 4). Pop., 1901, 1482; 1911, 1375. Near Coldstream is the famous ford of the Tweed, where the English made famous crossings, once in the thirteenth century under Edward I, and again in the seventeenth century under Montrose. Here General Monk, 1659–60, raised the regiment still known as the Coldstream Guards (q.v.). Being a border town, Coldstream, like Gretna Green, was formerly celebrated for its clandestine marriages, and the Marriage House still remains. About 4 miles to the south of Coldstream is Flodden Field (q.v.).

COLDSTREAM, LADY CATHARINE. A Scotchwoman in Foote's *The Maid of Bath.*

COLDSTREAM GUARDS. A regiment of foot guards in the British army, forming part of the Royal Household Brigade. It is one of the oldest regiments in the British service, dating from 1660. In that year General Monk, who after the death of Cromwell took sides with the Parliament and the army, organized the regiment at Coldstream, a border town of Berwickshire, Scotland, whence the name of the regiment, and marched with it into England. It has seen service in every British campaign of any magnitude and has emblazoned on its regimental colors the names of many of the most brilliant victories of British arms. It was first known as Monk's Regiment, but when Charles II ascended the throne, Parliament gave the regiment to him as part of his Household Brigade, and it has since borne its present name. See FOOT GUARDS; HOUSEHOLD TROOPS.

COLD'WATER. A city and the county seat of Branch Co., Mich., 125 miles (direct) west-southwest of Detroit, on the Lake Shore and Michigan Southern Railroad (Map: Michigan, D 7). It is the seat of the State School for Dependent Children and has a public library and several fine lakes and parks. It has manufactories of shoes, sporting goods, Portland cement, flour, marine engines, condensed milk, liniment, and machine-shop products, and contains the Bromo-Hygia Mineral Wells. The city owns and operates its water works and electric-light plant. Settled in 1830, Coldwater was incorporated in 1862. It is governed by a mayor, elected annually, and a city council. Pop., 1890, 5247; 1900, 6216; 1910, 5946.

COLD WAVE. A term first applied by the United States Weather Bureau in 1872 to the areas of cold, clear, dry air that flow near the ground from Canada southward over the United States and become the so-called "northers" when they reach the Gulf States, or "Nortes" when they reach the Gulf coast of Mexico and Yucatan. The northers of Colon may possibly have a different origin. The cold stratum of air, being quite shallow, keeps to the lowlands and rarely rises to the 5000-foot level; there are but one or two cases on record in which it attained the altitude of Cheyenne or Santa Fe; often it is not deep enough to overflow the 3000-foot level of the Appalachian Range. The cold wave advances with a well-defined front, marked by a sudden fall of temperature and an outflowing wind that undoubtedly curls upward and overflows backward, forming an advancing border of clouds with spits of rain or snow. The barometric pressure underneath this cloud is a few hundredths of an inch higher than in front of it, and it is this difference of pressure that causes the mass of cold air to underflow and lift up the warmer air as it spreads southward towards the equator. This excess of pressure is in part caused by gravity or the hydrostatic pressure due to the weight of the air in the rear, and is also in part the result of the diurnal rotation of the earth on its axis, giving a centrifugal force to the denser cold air greater than that of the neighboring warm air. The progress southward or southeastward of the front of a cold wave is so steady that, having charted its position at several successive moments by means of telegraphic reports, the Weather Bureau has almost always been able to forecast its future progress with satisfactory accuracy, thereby enabling all interested in the matter to make provision against sudden drops in temperature, which often exceed 30° in 24 hours. According to the technical definition adopted by the Weather Bureau, the forecast of a cold wave (as made by hoisting the cold-wave flag) implies that there will be a drop of at least 20° within 24 hours, and that the temperature will go below freezing. Similar sudden changes in the warmer half of the year, when temperatures do not go below freezing, are simply cool waves.

COLDWELL, GEORGE ROBSON (1858–). A Canadian lawyer and statesman. He was born in Durham Co., Ontario, and was educated there and at Trinity University, Toronto, where he graduated in 1880. Removing to Manitoba, he was admitted to the bar of that province in 1882. He practiced his profession at Winnipeg and afterward at Brandon, where he entered municipal life, serving as alderman. He was elected a Conservative member of the Manitoba Legislature, and in 1907 was appointed Provincial Secretary, Municipal Commissioner, and Minister of Education in the administration of Sir Rodmond Palen Roblin (q.v.), later resigning the provincial secretaryship. He was elected a councilor of Manitoba University and in 1910 became a member of the Royal Commission to inquire into the Manitoba system of technical schools.

COLE. See RAPE.

COLE, ALFRED DODGE (1861–). An American physicist, born at Rutland, Vt. He was educated at Brown University and also studied at Johns Hopkins, Harvard, Berlin, Cornell, and Chicago universities. Between 1885 and 1901 he was instructor in chemistry and physics, acting professor, and professor at Denison University. In 1901–07 he was professor of physics at Ohio State University, to which, after a year at Vassar College, he returned as head of the physics department. He served as trustee of Denison University in 1901–07 and again in 1911– . In 1911 he was elected secretary of the American Physical Society. His publications include researches on electric oscillations, electric waves, and the capillary electrometer.

COLE, FRANK NELSON (1861–). An American mathematician, born at Ashland, Mass. He was educated at Harvard University, where in 1885–87 he lectured on mathematics. Between 1888 and 1895 he was instructor and assistant professor of mathematics at the University of Michigan; he was then appointed professor of mathematics at Columbia University. He became secretary of the American Mathematical Society in 1895 and an editor of its *Bulletin* in 1897. He published *The Diurnal Variation of Barometric Pressure* (1892) and contributed to the second edition of the NEW INTERNATIONAL ENCYCLOPÆDIA.

COLE, GEORGE WATSON (1850–). An American bibliographer, born in Warren, Conn., and educated at Phillips (Andover) Academy. He studied law and practiced from 1876 to 1885, when he became cataloguer of the Fitchburg (Mass.) Public Library. He was librarian of the Jersey City Free Public Library in 1891–95 and then gave himself up entirely to bibliographical work. He published the valuable *Catalogue* (5 vols., Americana, 1907; 2 vols., English Literature and Miscellanea, 1909) of the E. Dwight Church library; *Bermuda in Periodical Literature* (1898; rev. ed., 1907); and *First Folio of Shakespeare* (1909).

COLE, SIR HENRY (1808–82). An English official, art critic, editor, and etcher. He was born at Bath and was educated at Christ's Hospital. Appointed assistant keeper of the records by Lord Langdale in 1838, he contributed by his writings to the erection of a general-record office. In 1845 he won the prize offered by the Society of Arts for a tea service, and the design submitted by him afterward became exceedingly popular. In 1846 he became a member of the Society of Arts, and by his efforts promoted those exhibitions of art manufactures (1847–48–49) which led to the great Crystal Palace Exhibition in 1851. He played an important part in the erection and organization of the South Kensington Museum and was also one of the principal founders of the National Training School (1876), which was subsequently (1882) reorganized as the Royal College of Music. Under the pseudonym of Felix Summerly he wrote *The Home Treasury* (1841) and other works. His etchings, published 1860–66, have little artistic value.

COLE, KING. A British king of the third century, who is said to have taken Camulodunum from the Romans and to have named it after himself, Colchester. According to some of the old chroniclers, he was the father of the Empress Helena, mother of the Emperor Constantine. He is the subject of the well-known nursery rhyme, "Old King Cole was a merry old soul."

COLE, MRS. In Foote's play *The Minor*, a character modeled on Mrs. Douglass, a notorious woman of the eighteenth century.

COLE, THOMAS (1801–48). An American

landscape painter. He was born in Lancashire, England, Feb. 1, 1801, and came to America at the age of 19. He had learned wood engraving in Liverpool and practiced it a short time in Philadelphia. His love for painting was awakened by an itinerant portrait painter, who, passing through the village of Steubenville, Ohio, gave him some instruction in the rudiments. After a few years of varied success at landscape work and two years' study at the Philadelphia Academy, Cole reached New York in 1825, where he received counsel and encouragement from Durand and Trumbull, and his success began. He traveled three years in Europe and visited Italy again in 1841, but preferred the scenery of America to that of the Old World. He was the founder of the Hudson River school (q.v.) of landscape painting, from which American landscape art has developed. In his large allegorical pictures, such as the "Expulsion from Eden," and in the series of the "Course of Empire," in the New York Historical Society, and the series of "The Voyage of Life," he endeavored to achieve a moral object, but to the detriment of the landscape, which is very artificial. His small paintings of the wild scenery of New York State and New England, however, show truer feeling, and though his color is always thin and dry, he was the first to give the real character of American landscape. Some of his larger canvases, which are panoramic in character, are original and impressive, as, e.g., "Oxbow," a scene on the Connecticut River, in the Metropolitan Museum, New York, which possesses five of his paintings. He died near Catskill, N. Y., Feb. 11, 1848. Consult: Tuckerman, *Book of the Artists* (New York, 1827); his biography by Noble (ib., 1853); Isham, *History of American Painting* (ib., 1905).

COLE, TIMOTHY (1852–). An American wood engraver, born in London. He came to the United States when very young, studied under Bond and Chandler, and in 1875 began to illustrate for the Century Publishing Company in New York City. His first series, "The Old Italian Masters," was finished in 1892. This was followed by the Dutch and Flemish series in 1896 and the English in 1900. The "Old Spanish Masters" was begun in 1902 and completed in 1907; the French series followed in 1910. He is now engaged on the old masters in American public and private galleries. By many critics Mr. Cole is considered the best of modern engravers. Several of the French engravers may be his equals, or technically cleverer than he, but there is none whose work is more substantial. He is especially effective in his use of the white line and in reproducing textures; his results in general are produced by conservative methods, in the employment of which he has gained breadth and power and appreciation of light and of the personality of his subject. He gives the intimate qualities of each school, so that there is no mistaking one for another, and yet he retains his own individuality. Consult Weitenkampf, *American Graphic Art* (New York, 1912).

COLE'BROOKE. See GRAND FALLS.

COLEBROOKE, HENRY THOMAS (1765–1837). An eminent English Orientalist. He was born in London, June 15, 1765. From the age of 12 to 16 he resided in France, and in 1782 he went out to India, where, after serving in various civil capacities under the East India Company, he was appointed professor of Sanskrit in the newly founded college at Fort William. Afterward he became a judge at Mirzapur, and subsequently held the appointment of President of the Board of Revenue. During his residence in India he gained an extensive knowledge of the literature of the Vedas and of the Sanskrit grammarians, metaphysicians, and mathematicians. A sound critical judgment marks all his writings. He was a director of the Royal Asiatic Society of Bengal; and many of the most valuable essays in the *Asiatic Researches* were contributed by him. These, with other papers of his, were republished as his *Miscellaneous Essays*, in 2 vols. (1837). The translation of the great *Digest of Hindu Laws*, left unfinished by Sir William Jones, was intrusted to him. He likewise made translations from Sanskrit works on mathematics, religion, and philosophy, which have remained as important contributions to our knowledge of India. (Consult his *Miscellaneous Essays*, London, 1837; new ed., 1873.) Colebrooke wrote a Sanskrit Grammar (1805) and contributed to Sanskrit lexicography by his edition of the *Amarakośa* (Serampur, 1808). His *Essay on the Vedas* (1805) was for many years the standard work on the subject. After his return to England he was made director of the Royal Asiatic Society. He died in London. Consult his *Life* by Sir T. E. Colebrooke (London, 1873).

COLE'MAN. A town on Old Man River, in the Macleod district, Alberta, Canada, and on the Canadian Pacific Railway, 10 miles from Crow's Nest Pass. It has banking facilities and an electric-light system and water works. It is a coal and coke centre, where two companies give employment to about 1000 men. Good fishing and hunting are to be had in the vicinity. Pop., 1911, 1557.

COLEMAN. A city and the county seat of Coleman Co., Texas, 120 miles (direct) southwest of Fort Worth, on the Gulf, Colorado, and Santa Fe Railroad (Map: Texas, C 4). It has beef, cotton, grain, and brick interests, and there are some deposits of coal and oil gas. The water works and electric-light plant are owned by the city. Pop., 1900, 1362; 1910, 3046.

COLEMAN, ARTHUR PHILEMON (1852–). A Canadian educator. He was born at Lachute, Province of Quebec, but removed to Ontario in his youth and was educated at the Cobourg Collegiate Institute and Victoria University, where he graduated with high honors in 1876. He afterward studied natural science at the University of Breslau, Germany, paying special attention to geology and undertaking numerous geological expeditions in different parts of Europe. He was professor of geology in Victoria University (1881–90), professor of assaying and metallurgy in the School of Practical Science, Toronto (1891–95), acting professor of geology in Toronto University (1895–1901), and after 1901 professor of geology. In 1893–1909 he was geologist to the Ontario Bureau of Mines. In 1910 he was awarded the Murchison medal for distinguished geological investigation. He was elected a fellow of the Royal Society of Canada, and in 1910 a fellow of the Royal Society. Besides numerous scientific papers, he published *Reports on the Economic Geology of Ontario* (1903) and *The Canadian Rockies: New and Old Trails* (1911).

COLEMAN, JOHN (1803–69). An American editor and clergyman of the Protestant Episcopal

church, born in Baltimore, Md. He was ordained priest in 1836, and from 1836 to 1856 was rector of Trinity Church, Philadelphia, Pa. For a time he was associated with the Rev. F. Ogilby in the editorship of the *Banner of the Cross*, published in Philadelphia. He prepared an edition (1840; with an introduction) of George S. Faber's *Difficulties of Romanism* (1826), and one (1840) of Dr. W. H. Wilmer's *Episcopal Manual* (1815; 2d ed., 1822).

COLE'MAN, JOHN (1832–1904). An English actor and theatrical manager. He won distinction as an actor, but his career was chiefly that of a manager. During the last half of the nineteenth century he was lessee and manager of various theatres, including the Olympic and Drury Lane.

COLEMAN, LEIGHTON (1837–1907). An American clergyman of the Protestant Episcopal church. He was born in Philadelphia, Pa., graduated in 1861 at the General Theological Seminary (New York City), took orders as deacon in 1860, and as priest in 1862, and from 1861 to 1879 was rector of churches successively at Bustleton, Pa., Wilmington, Del., Mauch Chunk, Pa., and Toledo, Ohio. After residence in England from 1879 to 1887, he was rector at Sayre, Pa., and in 1888 was consecrated Bishop of Delaware. His publications include *A History of the Lehigh Valley* (1872); *The Church in America* (1895); and *A History of the Church in the United States* (1901, in the "Oxford Church Text Series"). He contributed to the first edition of the NEW INTERNATIONAL ENCYCLOPÆDIA.

COLEMAN, LYMAN (1796–1882). An American educator and author, born at Middlefield, Mass. He graduated at Yale in 1817, was tutor there from 1820 to 1825, and later studied in Germany, and taught German at Princeton. From 1861 to 1868 he was professor of Greek and Latin at Lafayette College, and from 1868 until his death professor of the Latin language and literature. He published *The Apostolical and Primitive Church* (1844); *Ancient Christianity* (1852); *Historical Text-Book and Atlas of Biblical Geography* (1854; revised, 1859); *Prelacy and Ritualism* (1869).

COLEMAN, WILLIAM TELL (1824–93). An American pioneer. He was born in Cynthiana, Harrison Co., Ky., and was educated at St. Louis University. In 1849 he went to California and eventually settled in San Francisco, where he engaged in the shipping and commission business. After opening a branch in New York, he established a steamship line between that city and San Francisco in 1856. He was president of the vigilance committees (1851 and 1856) in San Francisco. In 1857 he removed to New York and conducted his business from that city until 1864. During the labor troubles of 1877 in San Francisco he again organized a force of several thousand men to preserve order. One of his most noteworthy achievements was the embellishment and extension of the town of San Rafael, Cal. See VIGILANCE COMMITTEE.

COLENSO, BATTLE OF. See SOUTH AFRICAN WAR.

COLEN'SO, JOHN WILLIAM (1814–83). An English bishop, born in St. Austell, Cornwall. He was educated at Cambridge, was fellow and tutor in St. John's College; became rector of Forncett St. Mary, in Norfolk, in 1846, and in 1853 was appointed first Anglican Bishop of Natal, South Africa. In England he had edited mathematical textbooks. The first of his works that attracted especial attention was *A Translation of the Epistle to the Romans, Commented on from a Missionary Point of View* (1861). The *Pentateuch and Book of Joshua Critically Examined* (7 vols.), in which the authorship of Moses and the accuracy of many statements in the books were questioned, and the inspiration of the Old Testament denied, appeared in 1862–79. His views were the result of study undertaken to answer questions on biblical chronology put by native converts. Especially through Kuenen (q.v.), his influence on biblical criticism was large. Colenso had already roused ecclesiastical opposition for permitting polygamy among his converts. He was deposed by his Metropolitan, the Bishop of Cape Town, but the deposition was declared void by the Privy Council. The trustees of the Colonial Bishoprics Fund then stopped his income, but the Court of Chancery ordered it to be paid, with arrears and interest. The see of Grahamstown was erected in place of that of Natal, in order to carry out the effect of the spiritual sentence without conflict with the state; and for the rest of his life Colenso occupied a schismatic position. He strongly favored the natives in their quarrels with the Boers. He published *Ten Weeks in Natal* (1855), a Zulu grammar (1859) and dictionary (1861), and translated the New Testament and part of the Old into the Zulu language. Consult Cox, *Life of Bishop Colenso* (2 vols., London, 1888).

CO'LEOP'TERA (Neo-Lat. nom. pl., from Gk. *κολεόπτερος, koleopteros,* sheath-winged, from *κολεός, koleos,* sheath + *πτερόν, pteron,* wing). An order of insects, comprising beetles, and characterized primarily by the possession of wing covers. See BEETLE.

COLEPEPER, kōl'pĕp-ēr, JOHN, LORD (?–1660). An English politician, prominent as a supporter of the Stuart kings against the Parliament. He was born at Wigsell, in Sussex, and after traveling abroad began to play an active part in county politics. In 1640 he became a member of the Long Parliament and, a zealous adherent at first of the popular party, gradually passed over to the side of the King, who in 1642 made him Chancellor of the Exchequer. With Falkland and Hyde, he played an important part in the negotiations between King and Parliament, preceding the outbreak of hostilities. He fought in the battle of Edgehill (Oct. 23, 1642) and in January of the following year was made Master of the Rolls, leaving the chancellorship to Hyde, of whose influence he was exceedingly jealous. On the downfall of the Royalist fortunes in 1645 Charles I intrusted Colepeper with the care of the person of the Prince of Wales, with whom in the following year he went to France. Later he lived with Prince Charles in the Netherlands and remained one of his principal advisers, going in his behalf on a mission to Russia (1650) and accompanying him to the Peace Congress of the Pyrenees in 1659. He returned to England after the Restoration, but died soon after. Colepeper was one of the ablest debaters and politicians of his time in England, but his influence suffered from his having a certain lack of confidence in his own opinions. He was given, too, to violent outbursts of temper.

COLEPEPPER, kōl'pĕp-ēr, CAPTAIN JOHN. A bully and murderer, nicknamed "Poppercul," in Scott's *Fortunes of Nigel.*

CO'LER, ALWIN GUSTAV EDMUND VON, 1831–

1901). A German physician, born in Groningen. He studied medicine in Berlin, entered the Prussian army in 1856, was made surgeon-general in 1874, and head surgeon of the general staff in 1889. General Coler's activity resulted in improvements of the highest importance in army hygiene, reforms in the military hospital service, the establishment of corps of sanitary officers, and the introduction of antiseptics into military surgical practice. He was also largely instrumental in formulating medical regulations for the German army, which have since been adopted by the armies of all civilized nations. In 1892 he was made professor at the University of Berlin. His writings include: *Sanitatsbericht über die deutschen Heere im Kriege 1870–71; Veroffentlichungen aus dem Gebiete des Militarsanitswesens* (1892); *Die transportable Lazarettbaracke* (with Langenbeck and Werner, 1890).

COLER, BIRD SIM (1868–). An American politician, born in Illinois. He established himself as a stockbroker in New York City, became prominent in municipal and State politics, and served as first comptroller of Greater New York in 1897–1902. In 1902 he was the Democratic nominee for Governor of New York, but was defeated by a small plurality in spite of his enormous vote in New York City. In 1905 he was elected president of the Borough of Brooklyn, on the Municipal Ownership ticket. His publications include: *Municipal Government as Illustrated by the Charter, Finances, and Public Charities of New York* (1900); *Socialism in the Schools* (1911); *Two and Two Make Four* (1912).

COLERAINE, kōl-rān′. A parliamentary and municipal borough and seaport, in the County of Londonderry, Ireland, on the Bann, 4 miles from the sea, and 47 miles by rail north-northwest of Belfast (Map: Ireland, E 1). It is built on both sides of the river, the main town being on the east bank. Its best-known foundation is the Academical Institution. The town is known on account of its linen manufactures, one brand of cloth being called "Coleraines." Other products include soap, pork, whisky, paper, and leather. Its port is accessible to ships of 200 tons. Salmon and eel fishing flourishes on the Bann. Pop., 1901, 6958; 1911, 7785.

COLERIDGE, ERNEST HARTLEY (1846–). An English author, grandson of S. T. Coleridge. He was graduated from Balliol College, Oxford, in 1870. He became secretary to the Lord Chief Justice of England in 1894. He edited *Letters of S. T. Coleridge* (1895); *Anima Poetæ* (1895); *Poetical Works of Byron* (1898–1901); *Life and Correspondence of John Duke, Lord Coleridge* (1904); a one-volume edition of Byron (1905); *Poems of Coleridge* (1907), and the *Complete Poetical Works of Samuel Taylor Coleridge* (2 vols., 1912).

COLERIDGE, HARTLEY (1796–1849). An English poet, born at Clevedon, Somersetshire, the eldest son of S. T. Coleridge. He studied at Oxford and was elected to a fellowship at Oriel College, from which he was removed by the authorities in 1826 on the charge of intemperance. For two years he resided in London. Then he returned to the Lake Country and, after having twice attempted school teaching, first privately at Ambleside and later at the grammar school of Sedbergh as an assistant in 1837 and 1838, settled at Grasmere. An almost constant wanderer about the vales, this diminutive figure, prematurely gray and old, became familiar to the peasantry as "Little Hartley." He was a scholar of rare attainment, a poet of exquisite taste and easy felicity, to whom, in the words of Dowden, "good thoughts came as of free grace." But, lacking will and the capacity for sustained application, he remained despondent, fragmentary, ineffectual. His longest literary work was in the preparation of an edition of the dramas of Massinger and Ford, with biographies of those authors (1840). He also wrote a series of lives of the *Worthies of Yorkshire and Lancashire* (1836; originally as *Biographia Borealis*, 1833). He is best known, however, for his verse, which, though it is distinctly lacking in power, is singularly fine in mood and happy in expression. Of the sonnet, a form, as Dr. Garnett observes, "which precisely suited both his strength and his limitations," he composed some of the finest examples in English. Such are "Whither," "To Shakespeare," "Prayer," "May, 1840," "Regrets," and "Ideality." His brother, Derwent, edited, with a memoir, his *Essays and Marginalia* and *Poems* (London, 1851). Selections are to be found in all important anthologies. His *Complete Poetical Works*, ed. by R. Calles, appeared in New York (1908). Hartley Coleridge was, his life long, a friend of Wordsworth, whose "To H. C.: Six Years Old" seems strangely prophetic.

COLERIDGE, HENRY NELSON (1798–43). An English man of letters, nephew of Samuel Taylor Coleridge. He was born at Ottery St. Mary, Devonshire, graduated at Cambridge, and studied law. Soon afterward he made a trip to the Barbados, which he describes in *Six Months in the West Indies* (1825; 4th ed., 1841). In 1829 he married his cousin, Sara Coleridge. He was his uncle's literary executor and prepared the second edition of the latter's political and dramatic works (1834). He edited *Literary Remains* (1836–39); *Confessions of an Inquiring Spirit* (1840, with notes by Sara Coleridge, 1849), and published *Table Talk* (1835), notes which he had collected during several successive years and gathered into a volume. His son, HERBERT COLERIDGE (1830–61), born at Hampstead, was a philologist. He was appointed secretary of a special committee of the Philological Society for the purpose of collecting material for a dictionary which was expanded into the *New English Dictionary*, published by the Clarendon Press under the editorship of Dr. J. A. H. Murray.

COLERIDGE, JOHN DUKE, BARON (1820–94). An English jurist, son of Sir John Taylor Coleridge (q.v.). He was born in London, graduated at Oxford in 1842, was called to the bar in 1846, and soon ranked high in his profession. He was a member of the House of Commons from 1865 to 1873, was knighted in 1868, became Attorney-General in 1871, was appointed Chief Justice of the Court of Common Pleas in 1873, and in the same year was raised to the peerage as Baron Coleridge of Ottery St. Mary. On the death of Sir Alexander Cockburn in 1880, he succeeded him as Lord Chief Justice of England. In 1883 he visited the United States. Consult E. H. Coleridge, *Life and Correspondence of John Duke, Lord Coleridge* (2 vols., London, 1904), and C. Yarnall, *Forty Years of Friendship* (ib., 1911).

COLERIDGE, SIR JOHN TAYLOR (1790–1876). An English judge and author, a nephew of Samuel Taylor Coleridge. He was born at

Tiverton, graduated at Oxford in 1812, was called to the bar in 1819, and was made a judge of the King's Bench in 1835 and a privy councilor in 1858. On the retirement of Gifford in 1834 he became for a short period editor of the *Quarterly Review*. He published an annotated edition of Blackstone's *Commentaries* (1825); *Public School Education* (2d ed., 1860); *Life of Keble* (1869). He was a friend of the latter as well as of Wordsworth, Pusey, and Newman.

COLERIDGE, SAMUEL TAYLOR (1772–1834). An English poet, philosopher, and critic. He was born at Ottery St. Mary, Devonshire, and educated at Christ's Hospital, where Charles Lamb was a schoolfellow. He was an omnivorous reader, even as a boy, and, gaining access to a library through a chance acquaintance, he read "right through the catalogue." He soon gained a remarkable knowledge of Greek, and before he was 15 plunged boldly into the sea of metaphysics. The sonnets of W. L. Bowles, which fell into his hands at this time, gave him his first impulse towards poetry. In 1791 he entered Jesus College, Cambridge. At the university his whole mind was given to classics, and he obtained a prize for a Greek ode. During his second year there, in a fit of despondency, he went up to London and enlisted in the Fifteenth Dragoons, under the name of Silas Tomkyn Comberback, or Cumberbatch—remaining faithful to the initials S. T. C., which were afterward to be so familiar among the readers of his period. His identity was discovered through an accident, and his friends intervened to procure his discharge. He returned to Cambridge in 1794, but never took a degree. During a visit to Oxford he became acquainted with Southey, and in the same year, after a trip through Wales, visited him at Bristol. The two young men and some of their friends now formed a scheme for emigrating to the United States, where, on the banks of the Susquehanna (the melody of the name seems to have been one of the inducements), they were to found a colony where the laws of equality and fraternity were to prevail, and the golden age was to be ushered in. They, with Wordsworth and other generous youth of the time, were deeply impressed with the proclamation of liberal principles in the French Revolution, though they afterward drew back, alarmed by its excesses, some into extreme Toryism. The establishment of their ideal "Pantisocracy" was delayed by the lack of capital; and a year or two later the dream faded away.

At Bristol, Coleridge became acquainted with his future wife, Sara Fricker, to whose sister Southey was engaged. Joseph Cottle, a bookseller in Bristol, had offered Coleridge 30 guineas for a volume of his poems and promised him a guinea and a half for every 100 lines he should write after finishing it. On this prospect he married in October, 1795, and settled in a cottage at Clevedon. After many delays his volume of *Juvenile Poems* appeared in April, 1796. His earlier work is all in the stereotyped style of the eighteenth century and shows little trace of the powers which were to make him famous. In the early part of 1796 he began the publication of a weekly review, the *Watchman*, devoted to literature and politics, but met with little success, and abandoned the undertaking after the tenth issue. In the winter of 1796 he settled at Nether Stowey, near Bridgewater, whither Wordsworth removed in the following year. He was freed from the material cares of life by the generosity of Charles Lloyd, the son of a Birmingham banker, who had become a devoted disciple of Coleridge, and Thomas Poole, who conferred on him a small annuity. At Nether Stowey, inspired perhaps partly by the beautiful scenery and still more by the strengthening companionship of his friend, he composed his finest poems, including the "Ancient Mariner" and the first part of "Christabel" and "Kubla Khan," though the two latter were not published until 18 years afterward. The two authors had many discussions on the principles of their art, which resulted in the publication, in 1798, of their epoch-making *Lyrical Ballads*. This little book, published anonymously, though a total failure at the time, was decisive in its influence on the future of nineteenth-century poetry, freeing it finally from the conventional trammels which had long bound it. The work of the two poets is singularly complementary—Coleridge treating supernatural subjects in such a way as to give a strong impression of their reality, while Wordsworth so handled the simplest themes as to disclose unsuspected elements of mystery and awe. Coleridge's contribution to the *Ballads* comprised the "Ancient Mariner," the "Nightingale," and two scenes from his play *Osorio*. In the edition of 1800 there was added "Introduction to the Tale of the Dark Ladie."

Coleridge, who had become a Unitarian at Cambridge, preached frequently during this period in the chapels of that body and had thoughts of becoming a regular minister. To deliver him from this necessity, two brothers named Wedgwood settled on him an annuity of £150, and this enabled him to carry out the long-cherished plan of going to Germany to study. In September, 1798, he sailed for Hamburg with Wordsworth, and after acquiring the language went to Göttingen, remaining, in all, nearly a year. This was a period of vast importance in his development, and he said himself that there was no time of his life to which he looked back with such unmingled satisfaction. He came under the influence of what Shairp calls "an impulse, the most original, the most far-reaching, and the most profound which Europe has seen since the Reformation." The first result of his new knowledge of German thought was not in philosophy, but in poetry; on his return to England he published his noble translation of Schiller's *Wallenstein*. He also contributed fitfully to the *Morning Post* to the end of 1802. Before that time, however, he had settled at Greta Hall, Keswick, in the Lake District, attracted by the proximity of Wordsworth and Southey, who were to share with him the designation of Lake Poets, given in derision by the *Edinburgh Review*. Here, in 1800, he wrote the second part of "Christabel." Driven from the North by rheumatism in 1804, he went to the Mediterranean, acting for some months as secretary to the Governor of Malta and spending several more at Rome.

On his return to England he delivered some lectures on poetry and the fine arts at the Royal Institution, London, and began the publication of the *Friend*, a periodical which contained too much abstruse philosophy to be popular and lived less than a year. During part of 1811 he was connected with the *Courier*, contributing articles of a general political nature. In 1813 his play *Remorse* was successfully produced at the Drury Lane Theatre and helped to relieve his

distressed financial condition. His enslavement to opium, which he had begun to take as a relief from his rheumatic pains, was now increasing and, in De Quincey's opinion, "killed him as a poet." His constitutional indolence and dislike for steady application completed his unfitness for meeting the demands of life. Roving between London and the Lakes, where his family was generally under Southey's care, he spent a number of baffled and disappointed years.

From 1816 until his death, July 25, 1834, he lived in the house of Mr. Gillman, at Highgate in London, where he received the kindest and most judicious care and at least to some extent mastered his craving for opium. Though he projected far more than his habits ever allowed him to accomplish, he left as the result of those years no inconsiderable bulk of critical and philosophic writing; the *Biographia Literaria* (1817, and, with annotations and biographical supplement by Sara Coleridge, 1847) is especially noteworthy. It was, however, as a talker, discoursing with an inexhaustible flow of ideas to admiring visitors, that he shone most brilliantly in his latter years. Talk was his best medium for showing himself to others. His style in prose writing was cumbrous and his matter involved. In reading his written work of this class we feel instinctively that the critic was greater than the criticism.

No man had ever appeared in England who united in so eminent a degree the three functions of critic, philosopher, and poet. With all his defects Coleridge must be recognized as being, in Mill's phrase, the greatest "seminal mind" of his time. The present generation does not realize how much it owes to him in many fields of thought—how many impulses, still powerful, he set in motion. In criticism he was the father of modern Shakespearean study, laying in a few pregnant sentences a broad basis for criticism in contrast to the narrow canons of Johnson and the eighteenth-century school. His *Aids to Reflection* and some of his other theological writing inspired Maurice and Stanley and the Broad Church movement as a whole. His aphorisms are often decisive—it is to him we owe what are now commonplaces, the distinction between genius and talent, fancy and imagination, wit and humor. Detached phrases of his are still upon the lips of many who do not remember their source—like "Every man is born either an Aristotelian or a Platonist," or "Prose is words in their best order; poetry is the best words in the best order." In philosophy, originally a fervent disciple of Hartley (q.v.), who had been a member of his own college, he passed on through the theories of Berkeley and Leibnitz, and, after falling under the influence of the German and other mystics, came to a point where, he says, the works of Kant took hold of him as with a giant's hand. He adopted and based all his teachings on Kant's distinction between the Understanding and the Reason; and while he has not as a philosopher left any complete system, yet he rendered excellent service by his insistence, in such a period as his, on the reality and preëminence of the spiritual verities. His introduction into England of German literature and philosophy, so powerfully seconded by Carlyle, is alone enough to give him a high place among the forces that determined the course of nineteenth-century thought among English-speaking people. But it is as a poet that he must hold the highest rank, though no other poet has ever attained such a place on so small a volume of first-class work. "Christabel," "The Rime of the Ancient Mariner," and "Kubla Khan" (which so good a judge as Swinburne has called "for absolute melody and splendor the first poem in the language") cannot be put in any but the highest class. Moreover, his influence on his successors must be taken into account. The Pre-Raphaelite movement, which Theodore Watts-Dunton defines as "the Renaissance of the Spirit of Wonder in poetry and art," owes more to him than to any other English poet. One can only regret that so much was wasted of the greatest powers which for generations had been granted to any Englishman.

Consult: *Complete Poetical Works . . . including Poems now Published for the First Time*, ed., with . . . notes, by Ernest Hartley Coleridge (2 vols., Oxford, 1912); *Complete Works*, ed. by Shedd (7 vols., London, 1853; New York, 1884); *Poetical Works*, ed. by Campbell (London, 1893); *Poems*, a facsimile reproduction of the proof and manuscripts of some of the poems, ed. by Campbell (ib., 1899); *Lyrical Ballads*, centenary ed. by Hutchinson (ib., 1898); *Anima Poetæ*, from his unpublished notebooks by his grandson (ib., 1895); lives by Gillman (ib., 1838), Traill ("English Men of Letters Series," ib., 1884), Dykes, the standard life (ib., 1894), and Hall Caine (ib., 1887); Cottle, *Early Recollections* (ib., 1837); Brandl, *Samuel Taylor Coleridge und die englische Romantik* (Berlin, 1886; Eng. trans. by Lady Eastlake, London, 1887); and a thorough and luminous discussion in Shairp, *Studies in Poetry and Philosophy* (Edinburgh, 1868). Consult also: E. H. Coleridge, *Letters of Samuel Taylor Coleridge* (London, 1895); Beers, *English Romanticism in the Nineteenth Century* (New York, 1900); Barnett, *Coleridge* (ib., 1904).

COLERIDGE, SARA (1802–52). An English author, born at Greta Hall, near Keswick. She was the only daughter of Samuel Taylor Coleridge and married her cousin, Henry Nelson Coleridge (1829). The early part of her life was spent with her uncle, Robert Southey. After the death of her husband she continued the editing of her father's works, and this was her principal literary work. Her intelligence and learning are shown in various translations and some original work, of which the tale *Phantasmion* (1837) is the most important. Consult her *Memoirs and Letters*, ed. by her daughter (London, 1873).

COLERIDGE-TAYLOR, SAMUEL (1875–1912). An English composer of music, born in London, Aug. 15, 1875. He was of African descent through his father, who was a native of Sierra Leone. His mother was an Englishwoman, and he himself was brought up under English influences. After a distinguished career at the Royal Academy—which he entered at 15, winning the composition scholarship in 1893, and studying under Villiers-Stanford until 1896—he devoted himself entirely to composition. In 1903 he organized a series of successful orchestral concerts at Croydon. His reputation as a composer grew rapidly, so that he was commissioned to contribute works to three different English festivals in one year. He made three visits, in 1904, 1906, and 1910, to the United States, where his works made a decided impression. His early death, on

Sept. 1, 1912, in London, cut short a career that had held out great promise for the future. His principal works are a *Symphony* in A minor, a *Ballad* for violin and orchestra, a *Ballad* for orchestra in A minor, a *Solemn Prelude*, an orchestral rhapsody *Endymion*, *Four Waltzes* for orchestra, *Bamboula Rhapsody Dance*, a *Concerto* for violin and orchestra, incidental music to *Nero*, *Herod*, *Ulysses*, *Faust;* an operetta *Dream-Lovers*, an oratorio *The Atonement*, five choral works with orchestra, of which *Hiawatha's Wedding* is the best known, chamber-music works of a high order of excellence, piano pieces, and songs.

COLES, kōlz, COWPER PHIPPS (1819–70). An English naval officer. He served as flag lieutenant to Sir Edmund Lyons in the Mediterranean (1853) and at the bombardment of Sebastopol (Oct. 17, 1854). In 1856 the plan of defensive armor for battleships began to engage his attention. The idea originally proposed had been that of a raft and shield, and this idea was modified by Coles into that of a vessel with a low freeboard surmounted by a series of turrets equipped with heavy guns. His plan for such a ship in a paper read in June, 1860, is so like the monitor type elaborated by Ericsson that the respective claims of the two men led to a bitter controversy. In 1864 the *Royal Sovereign*, a wooden ship built in 1857, was cut down and armored after Coles's plans. A vessel, constructed in accordance with Coles's specifications, was launched under the name of *The Captain*, in 1869, and on Sept. 7, 1870, capsized in a gale off Cape Finisterre, and almost everybody on board, including Coles, was drowned.

COLESEED. See RAPE.

COL'ET, JOHN (c.1467–1519). An English theologian, born probably in London. He studied at Oxford, traveled in Paris and Italy (1493–96), and became acquainted with Budæus and Erasmus. Returning to England, he took up his residence at Oxford and there lectured upon the Epistle to the Romans, displaying originality and independence of the schoolmen. The next year he lectured in the same fashion on 1 Corinthians, and so upon other New Testament books, until in 1505 he was appointed dean of St. Paul's, London. Having inherited from his father a large fortune in 1509, he founded St. Paul's School in London, of which William Lilly was the first master. His religious opinions were so much more liberal than was common at the time that he was subjected to considerable persecution. As dean of St. Paul's he lectured much on the Bible, disapproved of auricular confession and the enforced celibacy of the clergy, denied the efficacy of pilgrimages and the worship of images, and denounced corruption in the Church. His influence is traceable as paving the way for the Reformation, although it is probable that, like other humanists, he would not have left the old Church. Erasmus was much influenced by his emphasis on the study of Scripture. He died in London (or at Sheen, a few miles southwest of London), Sept. 16, 1519. Aside from his *Latin Grammar* and his *Daily Devotions*, his works did not appear until the nineteenth century, edited by Rev. J. H. Lupton, with English translations. Consult his biography by J. H. Lupton (2d ed., 1909), and F. Seebohm, *Three Oxford Reformers: Erasmus, Colet, and More* (3d ed., London, 1887).

COLET, kō'lā', LOUISE RÉVOIL (1810–76). A French poet and novelist, of the Neo-Romanticist school. Among her verses are *Les fleurs du midi* and *Penserosa*. The *Musée de Versailles* and *Les funérailles de Napoléon* are more sustained flights, the former crowned by the Institute. A comedy, *La jeunesse de Goethe* (1839), and two novels, *La jeunesse de Mirabeau* (1841) and *Les cœurs brisés* (1843), deserve mention, but nothing that she composed equals in interest her publication, in defiance of a legal injunction, of the correspondence of Madame Récamier with Benjamin Constant (1849). She enjoyed the friendship and admiration of the greatest littérateurs of her time. Two famous men, Victor Cousin, the philosopher, and Gustave Flaubert, the novelist, figure most prominently in her life. *Lui, roman contemporain* (1859), her most important novel, is a biased account of her relations with the latter. Her salon became in 1849 the continuation of the brilliant Récamier salon.

COLEWORT, (from *cole*, AS. *cāwel*, *cāul*, OHG. *kōl*, Ger. *Kohl*, cabbage, from Lat. *caulis*, cabbage, Gk. *καυλός*, *kaulos*, stalk + *wort*, AS. *wyrt*, plant, Ger. *Wurz*, root; ultimately connected with Lat. *radix*, root). A name given to some of the many cultivated varieties of *Brassica oleracea*, and applied, like the names "borecole" and "kale," to varieties differing from the cabbage (q.v.) in their open heads of leaves, which are used as greens, especially in the winter months. The same name is also given to cabbages cut for use before their leaves have fully closed into heads.

COLEY, WILLIAM BRADLEY (1862–). An American surgeon, born at Westport, Conn. He was educated at Harvard and Yale universities and entered upon the practice of medicine in 1888. He became attending surgeon at the General Memorial Hospital and the Hospital for Ruptured and Crippled, and also professor of clinical surgery at the Cornell University Medical School. His publications include the topic of "Hernia" in *Dennis's System of Surgery* (1896), *Warren and Gould's International Text-Book of Surgery* (1898), *Progressive Medicine* (1898), and *Keen's Surgery* (1907); and that of "Cancer" in *Twentieth-Century Practice of Medicine* (1897).

COLFAX, kōl'făks. A city in Jasper Co., Iowa, 23 miles east of Des Moines, on the Chicago, Rock Island, and Pacific Railroad (Map: Iowa, D 3). Colfax contains a public library and mineral springs of note. The chief industries are coal mining and the bottling of the spring water. The water works are owned by the city. Pop., 1900, 2053; 1910, 2524.

COLFAX, kōl'făks. A city and the county seat of Whitman Co., Wash., 55 miles (direct) south of Spokane, on the Palouse River, and on the line of the Oregon Railroad and Navigation Company (Map: Washington, H 4). The centre of a fertile agricultural country, it controls a considerable trade in live stock, grain, fruits, and lumber. The city contains a hospital and fine courthouse and owns its water works. Pop., 1900, 2121; 1910, 2783.

COLFAX, SCHUYLER (1823–85). An American statesman, born in New York City. He removed to Indiana in 1836, where he studied law, and in 1845 became editor of the *Register*, a Whig newspaper at South Bend, which under his management became the most powerful organ of its kind in that part of the State. He

was a delegate to the Whig conventions of 1848 and 1852, and in 1850 he was a member of the State convention to revise the constitution. After a defeat in 1851 he was elected to Congress in 1854, served seven consecutive terms, and was Speaker from 1863 to 1869. He was Vice President of the United States from 1869 to 1873. In the John C. Frémont campaign of 1856 a speech made by him was used for party purposes, and half a million copies were distributed over the country. He introduced several important acts for the reform of the postal system, in which he took an especial interest, and in 1862 framed the law which made fraudulent contractors felons. Charges of corruption were brought against him at the time of the Crédit Mobilier (q.v.) scandal, in 1873, but the charges were never conclusively substantiated. His reputation suffered, however, and he retired from public life. Consult Hollister, *Life of Schuyler Colfax* (New York, 1886).

COLGATE, kōl'gāt, JAMES BOORMAN (1818–1904). An American financier. He was born in New York City and received his first commercial training in the house of Boorman, Johnston and Company. He later established the banking house of Trevor and Colgate, afterward known as J. B. Colgate and Company. His extensive loans to the government and sound financial policy during the financial crisis of 1873 contributed materially to the reëstablishment of confidence both in the United States and in the markets of Europe. He was one of the founders of the New York Gold Exchange and was for several years its president. As trustee of Colgate (formerly Madison) University, he for 30 years made almost annual donations to that institution, the development of which is due chiefly to his constant care and valuable advice.

COLGATE, SAMUEL (1822–97). An American manufacturer and philanthropist, born in New York City. He became widely known as a soap maker, and the manufactory he built in Jersey City has developed into one of the largest establishments of the kind in the world. He was also prominent in philanthropical work. For more than 30 years he was trustee of Colgate University, and for many years he was president of the New York Baptist Education Society, president of the Society for the Suppression of Vice, and a member of the executive committee of the American Baptist Missionary Union and of the American Tract Society. One of his most noteworthy achievements was the collection of 30,000 volumes of reports (now in the Colgate University Library), comprising the documentary records of the Baptist denomination. Conjointly with his brother, James B. Colgate, he gave large sums to Colgate (formerly Madison) University, which in 1890 was named in honor of the Colgate family.

COLGATE (kōl'gāt) **UNIVERSITY.** An institution for higher education, situated at Hamilton, N. Y. It was founded in 1819. It has two departments, the College and the Theological Seminary. Colgate Academy was discontinued in 1912. The institution was incorporated in 1846 under the name of Madison University. In 1850 occurred a migration of a large number of the students and faculty to Rochester, N. Y., thereby founding the University of Rochester. The presidents of the university have been Nathaniel Kendrick, D.D., president in reality but not in name; Stephen W. Taylor, LL.D.; George W. Eaton, D.D., LL.D.; Ebenezer Dodge, D.D., LL.D.; George W. Smith, LL.D.; George E. Merrill, D.D., LL.D.; and the present incumbent, Elmer Burritt Bryan, LL.D. In 1890 the name of the institution was changed to Colgate University, in honor of William Colgate and his sons, one of whom, J. B. Colgate, established the Dodge Memorial Fund of $1,000,000. In 1893 Hamilton Theological Seminary became part of Colgate University. The attendance in 1914 was about 500. The faculty numbered 46. The library in 1914 had about 65,000 volumes, including the Samuel Colgate Historical Collection. Colgate University offers courses leading to the bachelor's and master's degrees in arts and science and to the bachelor's degree in divinity. It offers also courses in education which enable students to obtain college graduates' professional certificates. The university endowments in 1914 amounted to over $2,000,000, and the total value of the university property was estimated at over $3,000,000.

COLIC (from OF., Fr. *colique*, ML. *colica*, colic, from Gk. *κωλική, kōlikē*, colic, from *κῶλον, kōlon*, colon). A severe pain in the bowels or adjacent organs. When arising in the bowel, it is spasmodic in character and is dependent upon irregular contraction of the muscular coat of the intestines. Intestinal colic is a symptom of neuralgia of the intestines, caused by cold; of mild enteritis, caused by irritating food or purgative medicine; of toxic conditions such as lead poisoning, poisoning by the bacterial toxins of shellfish, etc.; of peritonitis, appendicitis, and other diseases. Infantile colic, common in the first six months of life, is caused usually by overfeeding, either of proteids or carbohydrates, which cause flatulence and distention. The infant is restless, draws up its legs, and has paroxysms of crying. Relief comes from vomiting or the passage of flatus. Infantile colic may be merely the result of enfeebled digestion, and careful modification of the food is the only remedy. If warmth, an aperient (such as castor oil), or peppermint, or tincture of ginger fails to give relief, a physician should be summoned. Renal colic is pain over the kidney and through the abdominal wall, due to passage of a calculus, or stone, from the kidney through the ureter into the urinary bladder. Biliary colic is caused by the passage of a gallstone from the gall bladder into the intestines.

COLIC IN ANIMALS. Colic (enteralgia) is a term usually applied to various morbid conditions of the stomach and intestines, particularly of the horse and mule, of which pain is the chief symptom; this does not signify a specific disease. Of the various forms of true colic, flatulent, or wind, colic and spasmodic, or cramp, colic are those more commonly met with. Spasmodic, or cramp, colic is caused by spasm of the small intestines and is due to the presence of foreign bodies in the intestines, such as undigested food, to large drafts of cold water, to exposure to cold, or to hard work too soon after eating. It is most frequent in high-bred horses. This form of colic always begins suddenly. The horse looks backward, shows acute pain, paws, lies down and gets up frequently. As the pain becomes more intense, the animal throws himself down with great violence and strikes with the feet.

These spasms are interrupted by intervals of quiet, but the intervals become shorter and shorter. This form of colic ordinarily yields promptly to appropriate treatment. Perhaps the best remedy is one ounce of chloral hydrate in a pint of water given as a drench. *Cannabis indica* gives good results, as also ether and laudanum. Flatulent, or wind, colic is sometimes used as synonymous with bloat (q.v.). Turpentine in doses of one ounce in a pint of linseed oil is a good remedy. Any alkaline substance neutralizes the acid fermentation and should be administered at once. In severe cases the bowels may be punctured at the most distended part by means of a trochar and cannula. Enemas of lukewarm water, to which a little soap has been added, are useful in both forms of colic, as are also cathartics, such as aloes in full doses. Consult H. C. Reeks, *The Common Colics of the Horse*, and M. H. Hayes, *Fricdberger and Frohner's Veterinary Pathology*, vol. i.

COLIGNY, kô'lē'nyē', or **COLIGNI**, GASPARD DE (1517–72). Admiral of France and Huguenot leader, born at Châtillon-sur-Loing, Feb. 16, 1517. He came of a noble family, his father having been Marshal Gaspard de Coligny, his mother Louise de Montmorency. He was introduced at court at the age of 22 and served under Francis I in Italy, where he evinced great bravery, especially at the battle of Ceresole (1544). Under Henry II he was made colonel general of the infantry, and in 1552 he became Admiral of France. In all the wars in which he took part he showed himself a born general and leader, his most noted exploit being the defense of Saint-Quentin (1557) against an overwhelming force of Spanish and English troops. He was finally forced to surrender and spent the next two years in a Spanish prison. On the death of Henry II, 1559, Coligny, who had previously adopted the Reformed faith, became, with the Prince of Condé, one of the great leaders of the Huguenots. In this capacity he was remarkable alike for his prudence and his bravery. Opposed to the Huguenot chiefs was the powerful Catholic party headed by the Duke of Guise and the Constable de Montmorency. At the disastrous battles of Dreux (1562) and Jarnac (1569), Coligny's skill saved the remnants of the Protestant army. Condé was slain on the field of Jarnac, and Coligny assumed the sole leadership until he gave way to the young Prince of Navarre. (See HENRY IV.) Together they besieged Poitiers, but the Huguenot forces were again routed on the bloody field of Moncontour (Oct. 3, 1569). When peace was concluded in 1570, Coligny went to court and was apparently well received by Charles IX, whose ardor he aroused by the plan of a national war against Spain, in which Coligny hoped to sink all religious differences. His projects and his favor with the King aroused the enmity of the Catholic party, whose leader, the Duke of Guise, always suspected the Admiral of having caused the death of his father at the siege of Orléans. Guise and the Catholics formed a plot to murder Coligny, which narrowly failed, and after their lack of success in this passed to a more general plot which resulted in the Massacre of St. Bartholomew (Aug. 24, 1572) in which Coligny perished. While upholding the Huguenot cause at home, Coligny exerted himself to secure a safe asylum for his coreligionists in the New World and sent repeatedly expeditions (Ribault in 1562, Laudonnière in 1564) to colonize what is now the southeastern part of the United States. Among his papers, burned by order of Catharine de'Medici, was his *History of the Wars of Religion in France*. Consult: Tessier, *L'Amiral Coligny* (Paris, 1872); Delaborde, *Gaspard de Coligny* (3 vols., ib., 1879–82); Bersier, *The Early Life of Coligny* (London, 1884); Blackburn, *Life of Coligny* (Philadelphia, 1869); Besant, *Life of Coligny* (London, 1892); Whitehead, *Gaspard de Coligny* (ib., 1905); Erich Marcks, *Gaspard von Coligny* (Stuttgart, 1892; vol. i (to 1560) is all that has so far appeared).

COLIMA, kô-lē'mȧ. The capital of the state of the same name, Mexico, on the Colima River, about 40 miles from the Pacific coast (Map: Mexico, G 8). It is situated at an altitude of 1476 feet, is generally well built, and has fine plazas and a number of pretentious buildings, among which are the government building and town hall, the Hospital de San Juan, and the market. The town has connections by rail and water with the port, Manzanillo, and is the seat of considerable trade. Colima was founded in 1523 by Gonzalo de Sandoval. Pop., 1900, 20,698; 1910, 25,148. About 40 miles to the northeast of the town, in the State of Jalisco, is the volcano of Colima (nearly 13,000 feet), which is constantly in a state of eruption.

COL'IN CLOUT. 1. A poetical satire on the clergy by John Skelton. 2. The nom de plume adopted by Spenser, suggested by the above. 3. A shepherd in Gay's pastoral, *The Shepherd's Week*.

COLIN CLOUT'S COME HOME AGAIN. A pastoral poem by Edmund Spenser, dedicated to Sir Walter Raleigh in a letter dated Kilkolman, Dec. 27, "1591" (probably 1595). In it he thanks that knight for sundry "favors and good turnes done to me at my late being in England."

COLINS (COLIN, COLYN), ALEXANDER (1527 or 1529–1612). A Flemish sculptor, born at Mechlin. Nothing is known of his artistic training, but in 1558 he was charged with the sculptural decorations of the castle of Heidelberg by the Elector Otto Heinrich, and in 1563, at the summons of Emperor Ferdinand I, he went to Innsbruck, where he modeled, after designs by Florian Abel, 20 reliefs on the tomb of Maximilian, in the Hofkirche. They represent scenes from the life of the Emperor; they show great technical ability and have been called "paintings in plastic form." Subsequently he was appointed court sculptor to the Emperor. Among his other works is the fine monument to the Archduke Ferdinand of Tirol, in the Silver Chapel of the Hofkirche and the mausoleum of Emperor Ferdinand II, his wife, and his son Maximilian II, in the cathedral at Prague. Consult *Gesammelte Schriften*, vol. i.

COL'ISE'UM. See AMPHITHEATRE.

COLL, kŏl. One of the Inner Hebrides, or western isles of Scotland, situated 7 miles northwest of the Island of Mull, Argyllshire. It is 14 miles long from northeast to southwest, with an average breadth of 2½ miles (Map: Scotland, B 3). More than a third of it is cultivated or in pasture. The isle is low and rocky and composed of gneiss. The highest point is 350 feet. It exports dairy produce, sheep, and cattle. Pop., 1901, 432; 1911, 389, engaged in agriculture and fishing. Chief place, Arinagour, which has a steamship service to Oban on the coast.

COLLAB'ORA'TION (Fr., from Lat. *collaborare*, to work together, from *con-*, together + *laborare*, to labor, from *labor*, work). The united labor of two or more persons on a literary production, as in the arrangement of a drama, or the compilation of a book requiring knowledge from different sources. Thus, Charles Reade and Dion Boucicault wrote *Foul Play;* Charles Dudley Warner and Mark Twain, *The Gilded Age.* Walter Besant and James Rice also long worked in collaboration upon numerous novels. The collaboration of Messrs. Erckmann and Chatrian (q.v.), in French, produced many delightful works. Perhaps most famous of all is the literary partnership of Beaumont and Fletcher (q.v.).

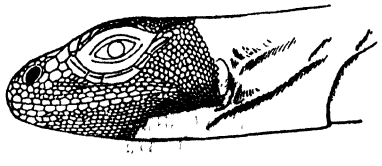
COL'LAMER, JACOB (1791–1865). An American lawyer and politician, born in Troy, N. Y. He removed when very young to Vermont, graduated at the university of that State in 1810, was admitted to the bar in 1813, and soon became one of the leading lawyers of the State. From 1833 to 1842 he was associate justice of the State Supreme Court. He was a member of Congress from 1843 to 1849, and in President Taylor's cabinet was Postmaster-General, which position, however, he resigned on the death of the President. In 1850 he was again elected judge of the Supreme Court of Vermont, and four years later was elected to the United States Senate, where he was chairman of committees on post offices, post roads, and the library. He remained in the Senate until his death.

COLLAPSE. See SHOCK.

COL'LAR (OF. *coler, colier,* Fr. *collier,* from Lat. *collare,* collar, from *collum,* neck; ultimately connected with AS. *heals,* with OHG. *hals,* Ger. *Hals,* neck). In architecture, a band around a column or other architectural member; the necking of the capital in the Doric, Ionic, and Tuscan orders. In mechanical work and engineering, a collar is any projecting band or flange shrunk on or otherwise applied so as to encircle a structural or mechanical member. For the collar as an article of apparel, see COSTUME.

COLLAR BONE. See CLAVICLE.

COL'LARED LIZARD. One of a genus (*Crotaphytus*) of iguanid lizards, characteristic of the dry, open regions of the southwestern United States. They are often called "collared" or "ring-necked" lizards, because of the double black collar around the wrinkled neck of the common Texan species (*Crotaphytus collaris*). This species is found from the Ozark Mountains to Nevada and southern California and is entirely insectivorous. Although it is stout of body, it can



HEAD OF COLLARED LIZARD, SLIGHTLY ENLARGED.

run very rapidly, and very often runs upon the hind legs alone. In the deserts of the Colorado valley there lives a second species, called "leopard lizard" (*Crotaphytus wislizenii*), which is larger, has no collar, and is noted for its fierce and greedy disposition. It eats not only blossoms, leaves, and insects, but also young horned toads, and all sorts of smaller lizards, killing and swallowing some two-thirds its own size. It will even kill and devour smaller individuals of its own species. This lizard is remarkable for the fact that not only the male, as is usual among lizards, but the female as well, undergoes a change of color in the breeding season (midsummer), the latter becoming salmon red on the whole abdominal region. Consult Merriam and Stejneger, *Death Valley Expedition* (Department of Agriculture, Washington, 1893), and Ditmars, *The Reptile Book* (New York, 1907).

COLLAT'ERAL (Fr. *collatéral,* It. *collaterale,* from ML. *collateralis,* collateral, from ML. *con-,* together + *lateralis,* relating to a side, from *latus,* side). In law, supplemental or related to the principal thing in consideration, especially, (*a*) given by way of security in addition to a principal obligation; (*b*) descended from a common ancestor but not from one another—a sense used to describe the character of relationship of individuals for legal purposes.

Collateral Security is either (*a*) something of intrinsic value actually delivered over and pledged to the creditor, the value of which is to be applied on the debt in case of default; or (*b*) an additional obligation, given to guarantee performance of a debt or duty. The term is more frequently used to designate a pledge of stocks, bonds, negotiable paper, or other evidences of obligation, as distinguished from a pledge of chattels. The practice in case of a default is for the creditor, upon notice to the debtor, to sell the securities and apply the amount received therefrom towards the satisfaction of his claim and charge the debtor with the deficiency, or credit him with the surplus, if any. See MORTGAGE; PLEDGE, FORECLOSURE; and consult the authorities cited under PLEDGE.

Collateral Relatives, more frequently spoken of as "collaterals," are those who are descended from the same common ancestor, but not one from the other, as lineal descendants are. Thus, an uncle is a collateral relative of a nephew, both being descended from a common ancestor, but the nephew not being a lineal descendant of the uncle. The term includes those in the relationship of brothers and sisters, aunts and uncles, nephews and nieces, and cousins. Collateral relatives are included in the term "heir," real property descending in the first instance to lineal descendants, if any, and then to collaterals in the order of their relationship or as prescribed by statutes. See CONSANGUINITY; DESCENDANTS; HEIR, LINEAL; DECEDENT; and consult the authorities referred to under DESCENT.

COLLATERAL WARRANTY. See WARRANTY.

COLLA'TION (OF. *collacion,* from Lat. *collatio,* collection, from *con-,* together + *latus,* borne, connected with *tolerare,* Gk. τλῆναι, *tlēnai,* OHG. *dulten,* Ger. *dulden,* to endure). In law, a collecting or bringing together of all the assets of an estate into one common fund for distribution among the heirs or next of kin; a term more particularly used where heirs who have received property from the deceased ancestor by way of advancement return it to the estate in order that a more equitable division of the whole may be made. The term is used in the civil law, and in England it is called *hotchpot* (q.v.). The term is not in general use in the United States, but the law in most States provides that advancements made to a legatee or devisee shall be considered as a part of the decedent's estate

and as such applied in satisfaction of the legacy or devise. See ADVANCEMENT.

In English ecclesiastical law, the term *collation* is used to denote the presentation of a clergyman to a benefice by the patron and bishop. See BENEFICE.

In maritime law, *collation* is sometimes employed in the sense of contribution or average (q.v.).

COLLATION OF MANUSCRIPTS. See BIBLE, *Textual Criticism.*

COLLÉ, kŏl'lā', CHARLES (1709–83). A French dramatic author and song writer, born in Paris. He became the secretary of the Duke of Orleans, the grandfather of Louis Philippe, and wrote plays for the theatre of the Palais Royal and for the Comédie Française, of which several are still produced. "Soldat de fortune dans les lettres," as he has been called, he declined to become a member of the Academy, though his songs have made him famous in French literature. His plays have been collected under the title *Théâtre de société,* and his verses as *Les chansons de Collé.* Among the best plays are: *La vérité dans le vin* (1747); *Dupuis et Desronais* (1763); and *La partie de chasse de Henri IV* (1774). His interesting *Journal historique* was edited by Barbier (Paris, 1807), and his *Correspondance inédite* by Bonhomme (ib., 1864).

COLLE, kŏl'lā, RAFFAELLO DAL (c.1490–1566), usually called RAFFAELLINO. An Italian painter, born at Colle, near Borgo San Sepolcro (Tuscany). He was a pupil of Raphael, whom he assisted in frescoing the Loggie of the Vatican, where portions of the story of Moses are from his brush. He is supposed also to have assisted Raphael in the Farnesina, and after his master's death to have worked with Giulio Romano in Rome and in the Palazzo del Te at Mantua. Still later he was employed to fresco several churches in the Duchy of Urbino, and the Villa Imperiale at Pesaro, the last after the cartoons of Bronzino and Gengas. He likewise assisted Vasari in various decorative schemes, and finally settled at Borgo San Sepolcro, where he founded a school. He painted in the manner of Raphael, without being a servile imitator. His principal paintings in oil are "The Resurrection," in the church of San Rocco, Borgo San Sepolcro; the same subject in the cathedral; the beautiful "Assumption" and an "Annunciation" now in the Gallery of Città di Castello; and several pictures in the chapel of the Olivet monks at Gubbio. Consult Patzak, *Die Villa Imperiale in Pesaro,* with biographical sketch of Colle (Leipzig, 1908).

COL'LECT. A brief, comprehensive prayer varying (like the epistle and gospel, which it immediately precedes) with the season of the Church year. Such prayers are found in all the earlier Christian liturgies, and most of those now used come from the sacramentaries of St. Leo, Gelasius, and St. Gregory. The name (which, however, does not occur in the Roman missal, where the word *oratio,* prayer, is used) is also of great antiquity. It probably comes from *collecta,* in the sense of *collectio,* a gathering, the prayer being originally designated *oratio ad collectam.* It may have originated as the prayer of a gathering of people at a church before starting in procession to some other station. In the oldest liturgies only a single collect was used, but with the growth of the calendar it became customary to "commemorate" a festival which was displaced by one of greater importance with the use of its collect; the sacred number of seven, however, might never be exceeded. In the Roman missal two other prayers, the *secreta* and the *communio,* are of similar structure to that of the collect, and, like it, vary with the day. These were not retained in the Anglican Prayer Book, which has almost literal translations of the Latin collects for nearly all its services. The structure of the collect is simple and uniform. It begins with a form of address nearly always to God the Father, generally including a commemoration of the special event celebrated, then offers as a rule a single petition for some grace or blessing, and ends normally "through Jesus Christ our Lord, who with Thee and the Holy Ghost liveth and reigneth, one God, world without end."

COLLECT, THE, or **COLLECT POND.** Formerly a large pond in the city of New York, part of whose site is now occupied by the Tombs prison. It drained the district later known as the Five Points and discharged into the Hudson River by a channel through the present Canal Street. The name "Collect" was a corruption of the Dutch "Kolch Hoek," meaning 'shell point' (Fiske, *Dutch and Quaker Colonies,* 1899).

COL'LECTA'NEA (Lat. nom. pl., collected sc. *dicta,* sayings). A name given to literary collections of any description, such as sayings of noted men, aphorisms, jests, miscellaneous anthologies, and chrestomathies.

COLLECTIVE PSYCHOLOGY. A term used to include all those subdivisions of "general psychology" which treat of the collective mind as opposed to the individual mind. For example, social psychology (q.v.), which treats of the social consciousness, ethnic psychology (q.v.), or the differential psychology of nations and races, and class psychology, the differential psychology of classes, professions, etc., are all subheadings of collective psychology. Consult: W. Wundt, *Völkerpsychologie* (Leipzig, 1904 and later); G. Le Bon, *The Psychology of Peoples* (New York, 1898); E. Tardieu, *Psychologie militaire* (Brussels, 1898); L. Dauriac, *Essai sur l'esprit musical* (Paris, 1904).

COLLECTIVISM (Fr. *collectivisme,* from *collecter,* ML. *collectare,* to collect, from Lat. *collecta,* collection, assembly, from *colligere,* to collect, from *con-,* together + *legere,* to gather). The vesting in the community, or collectivity, of all the means of production. Collectivism is the economic basis of both Socialism and Anarchism. Modern Socialism contemplates, as a rule, the vesting of property in the centralized state; Anarchists, especially the earlier school, held as their ideal the vesting of property in the local commune; Syndicalists would vest the property in groups organized on an industrial basis. See SOCIALISM; ANARCHISM; SYNDICALISM.

COL'LEEN BAWN, THE (Ir. *cailin,* girl, dim. of *caile,* girl, and Ir. *babhun,* Gael. *babhunn,* bawn, inclosure of a castle, barnyard), or THE BRIDES OF GARRY-OWEN. A play by Dion Boucicault, produced Sept. 10, 1860, based on Griffin's *The Collegians.* It was republished in the form of a novel in 1861.

COL'LEGE (Fr. *collège,* Lat. *collegium,* assembly, from *collega,* associate, from *con-,* with + *legare,* to send on an embassy, from *lex,* law. In its early Roman use "college" signified any association of persons having a common purpose or performing a specific function. In some respects it was synonymous with *corpus,*

a corporation or body of members, with *universitas*, a whole as contrasted with its parts, and with *societas*, a partnership. The Roman college was required to be incorporated by public authority, could possess common property, and could sue or be sued in the name of its manager. Many of these colleges were mercantile in character or were organizations of artisans similar to the mediæval guilds; but there were others having religious or political objects, such as the college of augurs, pontiffs, etc. In modern usage the term has similar applications, as college of cardinals, college of bishops, college of presidential electors, etc. It is also, especially in Great Britain, applied to associations of scientific or literary purposes, such as college of physicians, college of surgeons, college of heraldry.

In American usage the term "college" commonly indicates a stage of instruction intermediate between the high school or preparatory school and the university; but in Europe and, especially in Great Britain, the term is almost entirely confined to institutions of university rank. In France "collège" is, as a rule, a municipal institution equivalent to lycée and gymnasium, but there are some noteworthy exceptions, especially the Collège de France in Paris. The early colleges grew out of the monastic care of the indigent, sick, and feeble, and were at first, in connection with *hospitia*, established by the various orders. In 1180 a foundation for eighteen "scholar clerks" was made in the "Hospital of the Blessed Mary of Paris," commonly known as the Hôtel-Dieu. Other foundations devoted solely to this purpose soon followed. During the same period it was customary for groups of students to organize for the purpose of renting rooms, providing board, etc. Such organizations were self-governing, though ordinarily, and soon by compulsion, their governors were masters in the university. Sometimes, too, as at Bologna, alien needy students had national boarding houses under this name, as the College of Spain, etc. Under the influence of the mendicant orders and the example of Robert de Sorbonne, who about 1255 founded the college which bears his name for students who had already taken the earlier degree, colleges became more numerous, assumed the teaching function within their own walls, and tended to become coextensive with the university. In time, both in Paris and in the English universities, every member of the university had to attach himself to some college, and every person admitted to college had to matriculate at the university. In this way the colleges became the constituent members of the university, supporting not only the students and fellows, but the professors as well. For a more detailed account, see CAMBRIDGE, UNIVERSITY OF; OXFORD UNIVERSITY; PARIS, UNIVERSITY OF, ETC.

In this relation the college becomes a subcorporation. The English universities hold the examination and grant the degrees, while the colleges provide for the lodging of the students, to a certain extent for their support, and for their instruction. Students in one college may receive instruction in other colleges. In Scotland and in America the distinction between the college as the member and the university as the body has been neglected; and we consequently hear of the one and the other indiscriminately granting degrees, a function which in the English and in the original European view of the matter belonged exclusively to the university. Barnard College, Columbia, and Sibley College, Cornell, however, besides many correlated professional colleges, may be said to illustrate the older usage. Where there is but one college in a university, as is the case in the universities of Scotland, the two bodies are of course identical, though the functions which they perform are different. The University of Dublin and Trinity College are also virtually the same. In Germany there are no colleges in the English sense; and the verbal confusion between the college and the university is avoided by the latter's performing the functions of both in its own name, as two separate parts of its proper duties. See also COEDUCATION; COLLEGES, AMERICAN; COLLEGIATE EDUCATION FOR WOMEN; DEGREE; DUBLIN, UNIVERSITY OF; EDINBURGH UNIVERSITY; HARVARD UNIVERSITY; SORBONNE; YALE UNIVERSITY; and the names of individual colleges, universities, and other higher institutions.

COLLÈGE DE FRANCE, kô'lĕzh' dẽ frăns (Fr., College of France). A college in Paris, founded between 1518 and 1545 by Francis I, who tried in vain to secure Erasmus for its head. From the beginning it has been autonomous. The successive kings upheld its independence, notwithstanding the vigorous efforts of the University of Paris to secure control; this independence has been maintained, and though now under the charge of the Minister of Public Instruction, it has no connection with the University of France. From this has resulted its distinguishing characteristic: freedom of teaching and the encouragement of scientific research. The collège has had varying fortunes, but its activity has been continuous; even during the Revolution, although it had been the royal college, its reputation saved it from suspension. Originally founded for the teaching of Hebrew, Greek, and Latin only, it has now 40 different chairs. Instruction is gratuitous, no examinations are held, no diplomas given. The collège is specially designed to attract scholars other than the ordinary university students. In its long roll of illustrious teachers are included the names of Ramus, Gassendi, Rollin, Sylvestre de Sacy, Barthélemy Saint-Hilaire, Laboulaye, Renan, Michelet, and Gaston. Consult Goujet, *Le Collège Royal de France* (Paris, 1758); Bouchon-Brandely, *Le Collège de France* (ib., 1873); Lefranc, *Histoire de Collège de France* (ib., 1892); Renan, *Questions contemporaines* (ib., 1868).

COLLEGE JOURNALISM. See JOURNALISM, COLLEGE.

COLLEGE OF ARMS. See HERALDS' COLLEGE.

COLLEGE OF ELECTORS. See ELECTORAL COLLEGE.

COLLEGE OF HERALDS. See HERALDS' COLLEGE.

COLLEGE OF THE FOUR NATIONS (Fr. *Collège des Quatre Nations*). An appellation given to the Collège Mazarin, founded 1661, from the fact that that university was founded for the free education and support of 60 sons of gentlemen residing in the provinces of Pignerol, Alsace, Flanders, and Roussillon.

COLLEGE PARK. A village in Prince Georges Co., Md., 8 miles northeast of Washington, D. C., on the Baltimore and Ohio Railroad. It has a fine situation, as a suburb of the capital, and is the seat of the Maryland Agricultural College and Experiment Station,

established 1850. There are also aëroplane factories. Pop., 1913, about 350.

COLLEGES, AMERICAN. The offspring of European colleges, and possessing at first the same general form of organization, American colleges have gradually undergone changes which make them distinctive. Harvard (q.v.), the oldest, was founded in 1636, under the influence of men who for the most part had received their education at Emmanuel College, Cambridge University. The second American college, William and Mary (q.v.), founded in 1693, and the third, Yale (q.v.), founded in 1701, were modeled on similar lines. The numerous institutions founded since then have followed very closely the same traditions. During the eighteenth century there were 21 such institutions founded, 9 before the Revolution and 12 afterward. From 1800 to 1830 there were 33 such foundations; from 1830 to 1863 there were 180; from 1865 to 1900 there were 244; in 1911–12 the United States Bureau of Education received reports from 596 degree-conferring institutions of college rank, a number which represents perhaps but two-thirds of the total number of institutions in the country claiming such rank.

The early colleges were separate institutions of learning, each offering a single prescribed course of study leading to the degree of A.B. and, with some additional work, to that of A.M. This course was intended to furnish a liberal education and to prepare the student for the Christian ministry or other learned profession. Both Harvard and Yale came under the control of self-perpetuating corporations and relied for their support on tuition and private endowments. Most of the earlier and many of the later colleges were controlled in the interest of certain religious denominations, it being frequently part of the organic law of such institutions that the president and trustees should be members of the church that dominated the school.

The leading changes in the early college system have been the outcome of a demand for a wider circle of studies in the liberal programme; the development of better systems of secondary instruction, to which could be intrusted a large part of the work formerly done by the college; the growth of specialized instruction preparatory to the various professions not only of law, medicine, and theology, but also of the various fields of applied science; and the appearance of higher institutions under the support and control of the States, notably in the West and the South. In many of the colleges, also, e.g., Harvard, Yale, and Columbia, the influence of the sectarian element in control has largely disappeared. The development about the nucleus of a college of liberal arts of colleges for special professional instruction has led to the university, so called, although many institutions bearing that name give very little attention to graduate instruction of the true university character.

At first the Colonial colleges took from the grammar schools students who had barely attained a fair knowledge of Latin. As the character of secondary instruction grew better, the entrance requirements of the colleges grew severer. As a result, the average age of entrance of students increased, until at Harvard it is at present over 19, an age at which students were commonly graduated in the earlier history of the institution. The curriculum, originally limited to Latin, Greek, a little mathematics, logic, metaphysics, rhetoric, and theology, was extended by the introduction, in the latter part of the eighteenth century, of astronomy and natural philosophy and, early in the nineteenth century, of modern languages and the elements of the natural and political sciences. This process of expansion led, by the middle of the nineteenth century, to the elective system (see ELECTIVE COURSES), fostered by President Wayland of Brown University, and later by President Eliot of Harvard, President Barnard of Columbia, and President Tappan of Michigan. Certain work was still prescribed to the student, but new work was offered from which he was allowed to make a choice. Then, at many colleges, various courses were established, among which election could be made. The required subjects in each course were from some general field, as science, literature, modern languages, or classics, and distinct degrees, as B.S., Ph.B., B.L., etc., were bestowed upon the graduates of the different courses. Brown, Michigan, and Western institutions generally, illustrate this plan. Finally, at Harvard in 1894, the right of election, permitted in 1872 in the senior year, was extended to all subjects, except English A, in the first year, the degree of A.B. being given to all graduates of the college of liberal arts. To emphasize the equality of different lines of work thus elected, the Stanford University has adopted the policy of granting this degree even to those whose work has been almost entirely in the sciences. Cornell, too, has in this, as in many other respects, assumed the most liberal attitude in its educational aims. Few institutions remain where the whole course is prescribed; the rest either permit complete election, or prescribe certain studies, or leave the rest to be elected by the student.

Along with the development of broader curricula, and elective subjects and courses, has come the establishment of special professional colleges and colleges of applied science. Medical schools had appeared at the University of Pennsylvania and at Columbia and Harvard in the eighteenth century. Law schools were founded early in the nineteenth century, and scientific schools soon after. Some of these institutions were affiliated with older colleges, others were established independently. The year 1846 saw the foundation of the Union College of Civil Engineering, the Sheffield Scientific School, Yale; and the next year the Lawrence Scientific School at Harvard was established. Finally, there appeared the extension of the work of the liberal-arts college into further fields of scholarship and research, the organization of which has given rise to the graduate departments, the universities proper of the United States. (See UNIVERSITY.) But the distinction of the university from the college or group of colleges for undergraduates has not yet been clearly made. Some institutions calling themselves universities are merely colleges; others consist of several undergraduate colleges; in a few cases the name "university" is restricted to purely graduate departments.

It must be added that the professional colleges of law, medicine, and theology are coming to have more and more the character of graduate schools. In 1896 Harvard required all students entering the law school to be college graduates. A similar requirement exists in its medical school, and practically in its divinity school as well. Like steps have been taken at Columbia, where a combined collegiate and professional

course can be taken in six years, and the matter is being agitated generally throughout the country. It must be noted, however, that so far no important movement has been set on foot to make the colleges of applied science graduate schools. In case they follow in the path of the schools of law, etc., the special preparation for the higher professions, together with higher training in research and scholarship, will be left to the university, while the college will represent a higher liberal course preparatory to these. As it is, the word "college" is applied either to (1) liberal-arts colleges, or (2) professional colleges admitting undergraduates; and colleges of either type may be parts of universities or separate institutions.

The character of the influences and the life surrounding the student in the college which has grown into a large university is essentially different from that to be met with in the smaller colleges which have continued to work in the spirit of the old Colonial institutions. The smaller college affords less opportunity for election, thus bringing about greater uniformity in the work pursued. While it does not allow so much for individual peculiarities, it provides greater chance for intimate social intercourse among students and between them and the faculty, and for a firmer grip of the latter in discipline. The educational aim is frankly liberal and social rather than special and individual. Fraternities are an important feature in the social life, athletics prosper, and college spirit is strong. The faculty is even more a teaching body than a learned one, the reverse of which tends to be the case in the larger universities. Many believe that the smaller college affords a better liberal education for one who will later take up a profession or pursue special lines of research at a university. On the other hand, the attendance at the smaller college is not increasing in proportion to that in the collegiate departments of the universities. The length of the liberal-college course has been a matter of much agitation. Many advocate its reduction to three years; and President Butler, of Columbia, in his first annual report to the trustees of that university, proposed to award the B.A. degree at the end of the second year of undergraduate study. According to the present system, a student, beginning at six years of age, and progressing at the normal rate, will enter the college at 18, and not until 22 begin his special professional training. To gain time, in many universities, the senior collegiate year is allowed to be partly spent in professional work. At Chicago and Columbia the specialized work may begin in the junior year. The system of credits, too, generally in vogue, by which the satisfactory completion of a certain amount of work entitles a student to his degree, without regard to the time required to accomplish it, often renders graduation possible in less than four years.

The entrance requirements and curricula of the colleges have varied widely. Many colleges, especially in the West and the South, are yet little more than high schools. Some of the States have, however, interfered to determine what institutions shall be authorized to grant degrees, and it is highly desirable that this example should be universally followed. Attempts have also been made among the better colleges to insure greater uniformity in entrance requirements. In addition to numerous examination boards for different sections of the country, the greatest influences in raising the standards of entrance have been exercised by the Carnegie Foundation for the Advancement of Teaching, the National Conference Committee on Standards of Colleges and Secondary Schools, and the College Entrance Examination Board. In the West the State universities set the standard for collegiate entrance requirements within their several commonwealths.

It remains to mention a few new methods of control that have come to prevail over American colleges. Originally they were all governed by corporations or boards of trustees and were chartered either by the King or by Colonial legislatures. The older institutions have retained these charters, with the obvious modifications necessary after the Revolution. A little later, a movement was set on foot to take the colleges under State supervision and control, but it was checked by the decision in the Dartmouth College case, by which States were prevented from assuming control over the property of corporations existing by virtue of a charter sanctioned by their legislatures. The result was that the older Eastern foundations remained under private management, while in the West and the South the system of State universities—usually merely colleges—grew up. These institutions are controlled by regents appointed in various ways, often by the Governor of the State, although in Michigan they are elected by the people. In some of the Eastern institutions also the State has come to exercise a voice in the governing board. Ordinarily, the control of these private colleges is in the hands of a self-perpetuating board, which controls the finances, appoints the instructors, makes laws for the government of the institution, and confers degrees. The instruction and discipline of the students, their admission and dismissal, and the recommendations for degrees are left in the hands of the faculty as a matter of immemorial custom. Much general power is lodged in the hands of the president, and in the university colleges the deans are intrusted to a large extent with the control and direction of the students. In 1911–12 the number of students (men and women) in institutions of higher learning, including technical and professional schools, was 255,673. This is an increase of over 100 per cent in actual attendance within the period of 10 years, and of over 100 per cent in the ratio of students to population within the period of 10 years. The ratio of increase is highest with graduate students and with women. The total number of professors and instructors in the same institutions amounted at the given date, in round numbers, to about 25,000. The value of their productive property was estimated at $357,048,919, and the annual income was $104,514,095 from all sources. Consult Thwing, *College Administration* (New York, 1900); Harper, *The Trend in Higher Education* (Chicago, 1905); Flexner, *The American College* (New York, 1908); also the *Annual Reports* of the Carnegie Foundation for the Advancement of Teaching. See COLLEGIATE EDUCATION FOR WOMEN; ELECTIVE COURSES; UNIVERSITY; and the various colleges.

COLLEGE VIEW. A village in Lancaster Co., Neb., a few miles southeast of Lincoln, the State capital. It is the seat of Union College (Seventh-Day Adventist), opened in 1891. There is a manufactory of health-food products, and

a large printing and publishing house. The village owns its water works and electric-light plant. Pop., 1900, 865; 1910, 1508.

COL'LEGEVILLE. A village in Stearns Co., Minn., 10 miles (direct) west by north of St. Cloud, on the Great Northern Railroad (Map: Minnesota, C 5). It is the seat of St. John's University (Roman Catholic), opened in 1857. Pop., 1910, 606.

COLLEGEVILLE. A borough in Montgomery Co., Pa., 25 miles (direct) northwest of Philadelphia, on the Perkiomen River and on the Perkiomen Railroad (Map: Pennsylvania, L 7). It is the seat of Ursinus College (German Reformed), opened in 1870, and has a bridge over 100 years old. There are manufactures of steam and hot-water heaters. Collegeville was incorporated as a borough in 1895. Pop., 1910, 621.

COLLE'GIAN. See CLUB; COLLEGE (at the beginning).

COLLE'GIANS, THE. A novel by Gerald Griffin (1829). See COLLEEN BAWN.

COLLE'GIANTS (from Lat. *collegium*, assembly). A branch of the Dutch Arminians, who called their assemblies for worship "colleges." The sect was founded in 1619 by the brothers John, Adrian, and Gilbert van der Codde, at Rijnsburg, a couple of miles north of Leyden; hence they were also called the Rijnsburgers. They rejected creeds, and had no regular ministry, nor any form of church government. They adopted baptism by immersion, but their communion was open to all. They were not unlike the Plymouth Brethren of the present day. They opposed war and office holding by Christians. For a time they spread rapidly, but became extinct in the eighteenth century.

COLLE'GIATE CHURCHES (from Lat. *collegiatus*, member of a college, from *collegium*, assembly). A title applied to certain churches other than cathedrals to which is attached a body of clergy living in community, but having no voice in the government of the diocese. (See CANON; CHAPTER.) Of the numerous collegiate churches which flourished in Germany as early as the time of Charlemagne, that of Aix-la-Chapelle was especially famous. In England after the Reformation the title was retained, without much of the organization, as in the cases of Westminster, Windsor, Wolverhampton, Heytesbury, Southwell, Middleton; also Brecon in Wales, and Galway in Ireland. Ripon and Manchester have been constituted the cathedrals of new dioceses. The term is also applied to churches with an associated body of clergy without episcopal supervision. The best-known instance is the Collegiate Reformed Dutch Church of New York City.

COLLEGIATE EDUCATION FOR WOMEN. A system of education which originated in the United States and may be said to have sprung from the seminaries for young women. Although at first these were frequently concerned with somewhat superficial accomplishments, the trend was rapidly towards a sounder and broader scholarship. Their development, and, later, that of the coeducational public high schools, led to the establishment of women's colleges and to the admission of women to colleges for men.

In 1808 Mrs. Emma Willard (q.v.) opened a school for young women at Middlebury, Vt. In 1819 she removed by invitation to Waterford, N. Y., and 10 years later founded the celebrated Troy Female Seminary. By earnest and effective advocacy, notably by the publication of her *Plan for Improving Female Education*, she succeeded in getting the recognition and to some extent the aid of the State of New York in her efforts to give to women the same educational opportunities as to men. In 1819 Rev. Joseph Emerson opened a female seminary at Byfield, Mass., where such instruction was given as is done in academies for men. One of his students, Miss Zilpah P. Grant, became in 1824 the first preceptress of Adams's Female Academy at Derry, N. H. In 1828 she became the principal of a seminary at Ipswich, Mass., associating with her her fellow pupil at Byfield and assistant at Derry, Mary Lyon (q.v.). It was the latter's efforts, aided by the advice and plans of Miss Grant, that led to the founding and endowment in 1837 of Mount Holyoke College (q.v.) at South Hadley, Mass. This institution gave a three years' course nearly equivalent to that of the better colleges for men. Another prominent woman in the early history of advanced education for women was Miss Catherine E. Beecher (q.v.), who opened in 1827 a seminary for girls at Hartford, Conn., and in 1829 published an influential pamphlet on *Suggestions Respecting the Improvement of Female Education.* Later she turned her attention to the West, and through a national board and society did much for improving the facilities as well as for developing a sentiment for the higher education of her sex. In 1821 Wesleyan Seminary and Female College was founded at Kent's Hill, Me., and in 1834 a similar institution was established at Granville, Ohio. Georgia Female Seminary at Macon (now Wesleyan Female College) was chartered with collegiate powers in 1836, and in 1839 it was opened, offering a four years' course. Monticello Female Seminary, at Godfrey, Ill., was opened in 1838 on the plan of colleges for men, and it soon gained great reputation and influence. Elmira College, at Elmira, N. Y., claims to be the first women's college in the United States, and, with the exception of Queen's College, London (1848), probably in the world, to establish the same standard as in colleges for men. It was founded in 1855 and offered a four years' course. Vassar College (q.v.) was opened in 1865 at Poughkeepsie, N. Y.; Wellesley College (q.v.) at Wellesley, Mass., and Smith College (q.v.) at Northampton, Mass., in 1875; and Bryn Mawr College at Bryn Mawr, Pa., in 1885. These four, with the Goucher College (q.v.), Baltimore, are to-day the wealthiest of the female colleges in the United States. In 1888 Mount Holyoke College established a full collegiate department, and in 1893 the seminary was dropped. Wells College (q.v.) opened at Aurora, N. Y., in 1868 as a seminary, became a college in 1870, and in 1896 dropped the preparatory department. During the last 20 years several new institutions for women have been added. Among these are Randolph-Macon Women's College (1893), Simmons College, Boston (1902), Wheaton College, Norton, Mass. (1912), and Connecticut College for Women (1914). Among the several Catholic colleges for women are New Rochelle College, New Rochelle, N. Y.; Trinity College, Washington, D. C.; St. Elizabeth's, Madison, N. J.; Mt. St. Vincent's on Hudson; Notre Dame, Maryland; and D'Youville College, N. Y. Besides these institutions there were in 1911–12, 108 institutions for women in the United States call-

ing themselves with more or less correctness "colleges." This represents a decline in number as compared with the preceding 10 years, but it has been far more than made up by the increased attendance at the better women's colleges and the coeducational institutions. The latter are discussed in the article on COEDUCATION.

An additional class of schools offering higher instruction to women are the colleges affiliated with institutions for men. Of these the earliest to be established in the United States was Radcliffe College (q.v.), instruction in which is carried on by certain members of the Harvard faculty. It was founded by the Society for the Collegiate Instruction of Women in 1879 and assumed its present name with power to grant degrees in 1894. Barnard College (q.v.), founded in 1889, and at first affiliated with Columbia as Radcliffe is with Harvard, was made in 1900 an undergraduate college of the university, graduate work in that institution being thrown open to women. Brown University has a women's college that began work in 1892. The College for Women of Western Reserve University, at Cleveland, Ohio, was established in 1888, and in connection with Tulane University at New Orleans, La., there was opened in 1886 the H. Sophie Newcomb Memorial College for Women. Evelyn College, connected with Princeton University, was opened in 1887, but ceased to exist in 1897.

The attitude of the universities of Europe towards the admission of women is described in the article on COEDUCATION. In Great Britain there are many women's colleges connected with the great universities. At Cambridge Girton College was opened in 1869 and Newnham College in 1871. At Oxford Somerville Hall and Lady Margaret Hall were opened in 1879, and St. Hugh's Hall in 1886. At the University of London, University College and King's College have departments for women. Queen's College, London, was opened in 1848, Bedford College for Women in 1849, and Royal Holloway College in 1886. There are also numerous local universities and university colleges in England and Wales. In Ireland Belfast University, Dublin University, and the National University of Ireland (University College, Dublin, University College, Cork, and University College, Galway) admit women. In Scotland University College at Dundee is a college for women affiliated with the universities of London, St. Andrews, Edinburgh, and Glasgow. At Glasgow Queen Margaret College was in 1892 affiliated with the university at that place. On the Continent, however, women's colleges have not been established, but separate university courses for women are in existence in Russia. The Victoria Lyceum in Berlin, established in 1869, is probably the only institution in Germany giving higher courses for women, but no degrees. Private training and "finishing" schools suffice for those who do not enter the universities. In the various professions women find no chance for instruction to any extent in separate institutions except in the case of medicine. In the United States there is at present one medical school of repute for women. In London there is one, and Edinburgh has two; several are in Canada, and there is one at St. Petersburg.

The development of opportunities for the higher education of women has been actively promoted by a number of organizations, prominent among which are, in the United States, the Massachusetts Society for the University Education of Women, founded in 1877, and the Association of Collegiate Alumnæ, founded in 1882; and in England the Girls' Public Day School Company, founded in 1874, and the Cambridge Association for the Promotion of the Higher Education of Women, established in 1879. An organization for similar purposes was in 1898 formed in Berlin. The development of opportunities for the university education of women has also had a favorable reaction upon facilities for their secondary instruction, not only in the United States, but also in England and France, and to-day the system of girls' gymnasia in Germany shows the influence of the demand that women shall be prepared for the universities. Much progress has been made since 1898, when the Prussian Minister of Education refused an application for the establishment of a girl's school in Breslau, saying that university education for women is only for exceptional cases, and that the government will not undertake to prepare them for this. Since that date the whole system has been reorganized, and practically the same opportunities are open for higher education of girls and women in Germany.

Three statistical investigations into the health of college women have been undertaken—two in America by the Association of Collegiate Alumnæ in 1885 and 1900, and one in England by Mrs. Henry Sidgwick in 1897. In America the health of the college women compared favorably with that of working women, and in England with that of noncollege sisters and cousins. Nor does the marriage rate of college women seem to be less than that of their sisters. On the other hand, a large proportion of them are self-supporting, the principal occupation being teaching. Several recent studies indicate the following conditions: of 1076 graduates of Bryn Mawr up to Jan. 1, 1911, 28.5 per cent were teachers; 9.2 per cent were in other occupations; 5.5 per cent were engaged in study; 25.6 per cent were unmarried and without paid occupation; 27 per cent were married. Of the graduates of Mount Holyoke College from 1890 to 1909 about 65 per cent joined the teaching profession. Of the women graduates of the University of Wisconsin 88 per cent become teachers and 3.3 per cent engage in library work.

Consult: Thomas, "Education of Women," in Butler, *Monographs on Education in the United States* (New York, 1900); Fitch, "Women and Universities," in *Educational Aims and Methods* (ib., 1900); Lange, *The Higher Education of Women* (ib., 1900); French, "Educational Status of Women in Different Countries," in *Report of Commissioner of Education* (Washington, 1894–95); Crawford, *The College Girl of America* (Boston, 1905); Talbot, *The Education of Women* (Chicago, 1910). See COEDUCATION.

COLLENCHYMA, kŏl-lĕŋ'kĭ-mȧ (Neo-Lat., from Gk. κόλλα, *kolla*, glue + ἔγχυμα, *enchyma*, infusion, from ἐν, *en*, in + χεῖν, *chein*, to pour). A supporting tissue in certain plants, usually developed just beneath the epidermis, and recognized by the prominent thickenings in the angles of the cells. See HISTOLOGY (OF PLANTS).

COLLEONI, kōl'lā-ō'nē, or **COLEONE**, kō'lā-ō'nā, BARTOLOMMEO (1400–75). An Italian general, born at the castle of Solza, near Bergamo. At the age of 32 he fought in the Venetian army and distinguished himself in the war against the Milanese. He was a condottiere, and when Venice made peace with Milan he entered the

service of the latter. Finally he returned to Venice and was rewarded with large estates, upon which, during periods of peace, he introduced agricultural improvements. During the last 30 years of his life he was generalissimo of the Venetian state, in which capacity he is reputed to have displayed much strategical ability. A fine equestrian statue, executed by Andrea del Verrochio, was erected to his memory out of funds which he had left for that purpose.

COL'LES, CHRISTOPHER (1738–1821). An Irish engineer, the pupil of Pococke. He was born in Ireland, but came to America before the Revolution and delivered lectures in New York on pneumatics, gunnery, and inland navigation. One of the first steam engines made in America was designed by him; and he was among the first to propose water supply by reservoirs for the city of New York. As early as 1784 he presented to the New York Legislature a plan to connect Lake Ontario with the Hudson River by canals and such natural channels as could be used, and with this purpose in view he surveyed the Mohawk River. He published *Inland Navigable Communications* (1808).

COL'LETT, JAKOBINE CAMILLA (1813–95). A Norwegian novelist The keynote of her work is the emancipation of woman. In addition to her first and most popular novel, *The Magistrate's Daughters* (1855), she wrote *Tales* (1861); *In the Long Nights* (1863); *Against the Stream* (1879; 2d series, 1885); *Last Leaves, Recollections, and Confessions* (1868; 1872; and 1873)

COLLET'TA, PIETRO (1775–1831). An Italian Minister of War and historian. He served with distinction in the army under Joseph Bonaparte upon the latter's accession to the throne of Naples in 1806 and was retained in his military dignities by Ferdinand I. In 1820 he was dispatched to suppress the insurrection in Sicily. Appointed Neapolitan Minister of War in 1821, he was afterward imprisoned by the Austrians, but was finally permitted to reside in Florence, where he wrote his well-known historical work, *Storia del reame di Napoli, 1734–1825* (first published in 1834; Ger. trans. by Leber, 8 vols., Grimma, 1849–50). For his biography, see Gino Capponi's memoir of him published in the *Storia del reame di Napoli* (2d ed., Florence, 1848).

COL'LEY, SIR GEORGE POMEROY (1835–81). An English soldier. He was educated at the Royal Military College, Sandhurst; served in Cape Colony as a lieutenant, and was a border magistrate there in 1857–58; was ordered to China, and as captain participated in the taking of the Taku forts in 1860. He was professor of military administration and law at the Staff College, Sandhurst (1871–73). In 1875 he was promoted to a colonelcy for efficient service in Ashanti, and from 1876 to 1880 he was private secretary to Lord Lytton, at that time Viceroy of India. He was sent to succeed Sir Garnet Wolseley as Governor and commander in chief of Natal in 1880. In January, 1881, he commanded against the Boers at Laing's Nek and Ingogo, and on February 27 his detachment was annihilated at Majuba Hill (q.v.), and he himself fell. He was a good water-colorist, contributed to periodicals, and wrote the article "Army" for the 9th edition of the *Encyclopædia Britannica*. Consult Butler's biography (London, 1899).

COLLIBERTS, kŏl'ĭ-bērts; *Fr. pron.* kô'lē'-bâr'. See CAGOT.

COL'LIE. The Scotch shepherd dog. See SHEEP DOG and Plate of DOGS.

COLLIE, SIR JOHN. A British physician. He was educated at Aberdeen University. For many years he served the London County Council, first as assistant medical officer, then as medical superintendent of several classes, and finally as medical examiner and member of the Insurance Committee for London; for a time he was also examiner in physiology and hygiene at the British College of Physical Education and house surgeon at the Royal Maternity Hospital, Edinburgh, besides holding various other appointments. In 1912 he was knighted. His publications include: *The Emergency Book* (1899); *Schemes of Instruction in First Aid to the Injured, Home Nursing, and Hygiene* (1908); *Medical Evidence in the Laws Relating to Compensation for Injury* (1909); *A Simple Remedy for Grave Abuse* (1909); *Sidelights on Medical Technicalities from an Insurance Point of View* (1911); *Fraud and its Detection in Accident Insurance Claims* (1912); *Medico-Legal Examinations and the Workmen's Compensation Act, 1906* (1912); *Malingering and Feigned Sickness* (1913); *The Psychology of the Fraudulent Mind* (1913).

COLLIER, kŏl'yēr, CONSTANCE (1878–). An English actress, born at Windsor, Eng. In 1901 she was engaged by Beerbohm Tree, and for nearly six years she played in His Majesty's Theatre. She made her first trip to America in 1908, when she appeared at the Garrick Theatre (New York) as Charlotte in *The Latch*. She made return trips to the United States in 1909 and 1911, and in 1912 she toured in *Thais*. She also appeared in a revival of *Oliver Twist* (1912) in both New York and London. In 1914 she played with distinction the part of Emilia in Faversham's production of *Othello*.

COLLIER, JEREMY (1650–1726). A nonjuring English clergyman, born at Stow Qui, or Quire, in Cambridgeshire, Sept. 23, 1650. He went to Cambridge in 1669, took his degree of M.A. in 1676, and entered the ministry. At the revolution of 1688 he plunged into the stormy waters of controversy, his foeman being Gilbert Burnet, afterward Bishop of Salisbury. For a publication of his at this time, entitled *The Desertion Discussed* (1688), which maintained the invalidity of King William's regal authority and gave offense to the government, he was sent to Newgate, where he remained several months. On his release he rushed anew into party contentions and distinguished himself by the publication of several controversial works. Suspected of being a partisan of the Stuarts, he was again arrested in 1692 and imprisoned for a short time in the King's Bench. From this period his life was a perpetual literary strife, the government being the principal object of his attack. In 1713 he was consecrated a bishop among the nonjurors, and was their leading man after the death of Hickes in 1715. He died in London, April 26, 1726. Collier wrote many books, including the *Great Historical, Geographical, Genealogical, and Poetical Dictionary* (4 vols., 1701–21), founded on Moreri's, and *Ecclesiastical History of Great Britain to the End of the Reign of Charles II* (2 vols., 1708–14). The best edition of the latter work is by T. Lathbury (9 vols., London, 1852). It is a work of great learning, the first of its kind except Fuller's that had appeared. But the work by which he is best known is his *Short View of the Im-*

morality and Profaneness of the English Stage (1698), in which he attacked Dryden and Congreve as vigorously as D'Urfey, and which had a marvelous success. For his life, consult the *Ecclesiastical History*, edited by Lathbury (London, 1852).

COLLIER, JOHN PAYNE (1789–1883). An English Shakespearean critic and commentator. He was born in London. In 1820 he published *The Poetical Decameron*. From 1825 to 1827 he superintended a new edition of Dodsley's *Old Plays;* and in 1831 appeared his best work, a *History of English Dramatic Poetry, and Annals of the Stage*. From 1835 to 1839 he published three volumes on Shakespeare entitled *New Facts, New Particulars*, and *Further Particulars*, followed by an edition of Shakespeare in 8 vols. (1842–44). Not content with these efforts for the illustration of his favorite author, Collier, in 1852, published a volume entitled *Notes and Emendations to the Text of Shakespeare's Plays, from Early Manuscript Corrections in a Copy of the Folio of 1632, in the Possession of J. P. Collier*. This volume is now known as the Perkins Folio, as "Tho. Perkins his Booke" is inscribed on the cover. The publication excited great commotion in the literary world; opinion was divided, and the *Emendations* were furiously applauded or furiously assailed. It has since been proved that all the marginal notes are forgeries. In 1862 he published an excellent edition of Spenser; and the next year he began a series of reprints of our early poets and pamphleteers. Of his later publications, the most interesting is *An Old Man's Diary* (1871–72). For a list of Collier's forgeries, and the bibliography of the subject, consult Lee, *A Life of Shakespeare* (3d ed., London, 1900); and Warner, *Catalogue of MSS. of Dulwich College* (London, 1881). The question of Collier's emendations is fully considered in C. M. Ingleby, *Complete View of the Shakespeare Controversy* (1861).

COLLIER, PRICE (1860–1913). An American author. He was educated in Geneva and Leipzig, graduated from the Harvard Divinity School in 1882, and entered the ministry of the Unitarian church. For two years he was European editor of the *Forum*. He served in the navy during the Spanish-American War, and wrote a volume on "Driving" (1903) in Macmillan's *Sportsman's Library*. But he attained celebrity as the writer of essays on national characteristics, which were marked by much insight and real literary quality. In this field, in which he followed his father, Robert Laird Collier, he wrote *America and the Americans from the French Point of View* (1897), *England and the English from an American Point of View* (1909), *The West in the East, from an American Point of View* (1911), and *Germany and the Germans from an American Point of View* (1913), which was less sympathetic than some of his earlier works. At the time of his sudden death he was preparing a similar discussion of Norway and Sweden.

COLLIER, ROBERT JOSEPH (1876–). An American editor and publisher, born in New York City. He graduated from Georgetown University in 1894, and following this studied a year each at Oxford and Harvard universities. He became associated in the publishing business of his father, P. F. Collier, and on the death of the latter in 1909 succeeded him as head of the firm of P. F. Collier and Son, becoming editor and publisher of *Collier's Weekly*. He initiated the Lincoln Farm Association, which raised by popular subscription funds for purchasing the old Lincoln farm in Kentucky and erecting thereon a granite memorial at the log cabin in which Lincoln was born.

COLLIER, WILLIAM (1868–). An American actor and playwright. He made his first appearance in a children's company in 1879. From 1883 to 1888 he was a member of the Daly Theatre Company. *On the Quiet*, in which he starred in 1901–02, and *The Dictator*, in which, as Robert Travers, he had a great London success in 1905, were taken on an Australian tour (1906). Later he appeared in *A Lucky Star* (1909); *Bunty Pulls the Strings* (1912–13); *A Little Water on the Side* (1914). He also played rôles in the following plays of which he is part author: *I'll be Hanged if I Do* (1910); *Take my Advice* (1911); *Never Say Die* (1912); and he is sole author of *Caught in the Rain* (1906) and *The Patriot* (1908). Collier came to be known as a comedian with a large following.

COLLIER, WILLIAM MILLER (1867–). An American diplomat and commerce expert, born at Lodi, N. Y. He was educated at Hamilton College and Columbia College Law School, and was admitted to the bar in 1892; served as referee in bankruptcy of the northern district of New York State in 1898; was president of the New York State Service Commission from 1899 to 1903, and during the next two years lectured in the New York Law School. President Roosevelt appointed him special assistant Attorney-General in 1903, and in 1904 solicitor in the United States Department of Commerce and Labor. He was United States Minister to Spain from 1905 to 1909, when he became general legal counsel and special agent for various American corporations in Europe. His publications include: *The Law and Practice in Bankruptcy under the National Bankruptcy Act of 1898* (1898; 4th ed., revised by William H. Hotchkiss, 1903; 9th ed., 1912); *The Trusts* (1900); *The Civil Service Law of the State of New York* (1901); *At the Court of His Catholic Majesty* (1912).

COL'LIMA'TION. See MERIDIAN CIRCLE; TRANSIT INSTRUMENT.

COLLIN, kô'lăN', LOUIS JOSEPH RAPHAEL (1850–1916). A French figure and portrait painter. He was born in Paris and studied there at the Ecole des Beaux-Arts under Bouguereau and Cabanel. In 1873 he obtained a medal with "Sleep" (Museum, Rouen), and in 1889 the Grand Prix at the Paris Exposition. In 1902 he was appointed professor at the Ecole des Beaux-Arts. He is perhaps best known for such works as the decorations in the Sorbonne, and the ceilings of the Odéon and the Opéra Comique, Paris. He also decorated several ceilings in the United States. The most noted of his easel pictures are those of nudes in the open air, such as an "Idyll" (Arras), "Daphne and Chloe" (Alençon); "Floral" (1886, Luxembourg); "Eveil et Primerose" (1894, Bucharest), and many others in private collections, including the Anderson collection, New York. Collin is also a portrait painter, illustrator, and painter on faïence. His work is in the classical style of his masters Bouguereau and Cabanel, and in his decorative work the nude plays a conspicuous part.

COLLIN D'HARLEVILLE, kô'lăN' dăr'l'-

vĕl′, JEAN FRANÇOIS (1755–1806). A French dramatist. He was born at Mévoisins, near Maintenon, and after studying law devoted himself entirely to literature. His numerous character plays, which occasionally suggest the influence of Regnard, are noted for their gayety, wit, and comic episodes. The more popular are *L'Inconstant* (1780; played at the Comédie Française in 1786); *L'Optimiste* (1788); *M. de Crac dans son petit castel* (1791); *Le vieux célibataire* (1793), usually considered his best production; *Les châteaux en Espagne* (1803). He was an original member of the Institute. His theatrical works were edited by Moland (1876) and Thierry (1882). Consult the memoir by Andrieux in his complete edition of Collin (Paris, 1822).

COLLIN'EAR'ITY. See CONCURRENCE.

COLLINE (kŏl'līn) **GATE,** THE (Lat. *Porta Collina*, hill gate, from *porta*, gate, and *collinus*, hilly, from *collis*, hill). An important gate of ancient Rome, on the Quirinal, at the point where Rome was most exposed to attack, at the north end of the Servian Wall (q.v.). According to Ovid, Hannibal rode up to it and hurled a spear into the city. The victory won here by Sulla over the Marian forces (mainly Samnites), in 82 B.C., made his power supreme in Rome. The remains of the gate were discovered (and destroyed) during the building of the Treasury (1872–73).

COLLINGSWOOD. A borough in Camden Co., N. J., adjoining Camden, on the Pennsylvania Railroad and on Cooper River (Map: New Jersey, B 4). It is beautifully laid out and contains a fine park. Collingswood is in an agricultural region and has manufactories of wagons and wall paper. Pop., 1900, 1633; 1910, 4795.

COL'LINGWOOD. A city and a suburb of Melbourne (q.v.), Victoria, Australia.

COLLINGWOOD. A town and port in Simcoe Co., Ontario, Canada, on Georgian Bay, Lake Huron, 70 miles (direct) northwest of Toronto (Map: Ontario, D 3). It is important as the terminus of the northern division of the Grand Trunk Railway, and is the starting point for steamers to Owen Sound, Sault Ste. Marie, and Parry Sound. Its harbor, which is well protected, has a depth of 20 feet. Among the public buildings and institutions are the collegiate institute, Carnegie library, Young Men's Christian Association building, and an armory. There are also two parks, two skating and curling rinks, a government rifle range, and a government fish hatchery. The manufacturing industries and establishments include the most extensive steel-shipbuilding yards and dry docks in Canada, where some of the largest freight ships in the British Empire have been built; a large meat-packing and canning establishment, wire-nail and fence factories, grain elevator, planing mills, foundries, machine shops, saw mills, fruit and vegetable canneries. The town owns its water works, electric lighting, sewerage, and hydro-electric power plants. It has a United States consulate. Pop., 1901, 5755; 1911, 7090.

COLLINGWOOD, CUTHBERT, LORD (1750–1810). A British admiral, born at Newcastle-upon-Tyne. He went to sea on the *Shannon* at the age of 11 and in 1775 took part in the battle of Bunker Hill and was made a lieutenant for his services. He became a commander in 1779 and a rear admiral in 1799. Among the great naval victories in which he bore a prominent part were those of Lord Howe off Brest in June, 1794; of Lord Jervis off Cape St. Vincent in 1797; and of Nelson at Trafalgar in 1805, where his ship was the first to break through the line of French and Spanish vessels, and after Nelson had received his death wound he assumed the chief command. For his conduct in this battle he was raised to the peerage. There is a monument to him at Tynemouth. He is buried in St. Paul's. See the life, *A Fine Old English Gentleman* (London, 1875), by Davies; and Collingwood's *Memoirs and Correspondence* (2 vols., 1828), with a memoir by his son-in-law.

COL'LINS, ANTHONY (1676–1729). An English author, a noted deist writer. He was born at Isleworth or at Heston, near Hounslow, in Middlesex, June 21, 1676. He studied at Eton, and King's College, Cambridge, and in the Temple in London. In 1707 he published his *Essay Concerning the Use of Reason;* and in 1709 his *Priestcraft in Perfection,* which disturbed the churchmen of that time exceedingly. The controversy excited by this last work induced Collins to sum up several previous pamphlets in his *Historical and Critical Essays on the Thirty-nine Articles* (1724). He had published a *Defense of the Divine Attributes* (1710), in reply to the Archbishop of Dublin, who asserted the compatibility of divine predestination and human freedom. Collins was a philosophical necessitarian and afterward advocated his opinions more fully in his *Philosophical Inquiry Concerning Liberty and Necessity* (1715). In 1711 he went to Holland, where he made the friendship of Le Clerc and other eminent literati. On his return to England he published his *Discourse of Freethinking* (1713), the best known and the most important of all his works, which Swift assailed in one of his best pieces of irony, while Bentley disposed of its pretensions to scholarship. In 1718 he was made treasurer for the county of Essex, and in 1724 appeared his *Grounds and Reasons of the Christian Religion,* which gave occasion to no less than 35 replies. He defended himself in his *Literal Scheme of Prophecy;* and in 1727 published his last work, *A Letter to the Rev. Dr. Rogers on Occasion of his Eight Sermons on the Necessity of Revelation and the Truth of Christianity.* Collins died Dec. 13, 1729. He was a friend and correspondent of Locke, who declared that Collins had as much love of the truth for the truth's sake as ever he had met in anybody. His character for integrity and benevolence stood very high. For an estimate of Collins, consult Stephen, *English Thought in the Eighteenth Century* (London, 1881). See DEISM.

COLLINS, ARTHUR (1863–). An English theatre manager, born in London. He was apprenticed with a scenic artist, Henry Emden, at the Theatre Royal, Drury Lane, in 1881. From 1887 to 1896 he was stage manager at that theatre, and in 1897 he obtained a lease of Drury Lane and formed a managing company with himself as director. Under his management were produced: *Hearts are Trumps* (1899); *Ben Hur* (1902); *The Prodigal Son* (1905); *The Bondman* (1906); *The Sins of Society* (1907); *Marriages of Mayfair* (1908); *The Whip* (1909); *Everywoman* (1912).

COLLINS, FRANK SHIPLEY (1848–). An American botanist, born at Charlestown, Mass. He entered business in 1864 and later became connected with the Boston Rubber Shoe

Company at Malden, Mass. He early began research work in botany and became an active member of various botanical societies. Besides his contributions to botanical journals, he is author of *Flora of Middlesex County* (1888); *Phyotheca Boreali Americana* (1894–1911); "The Green Algæ of North America," in *Tufts College Studies* (1912).

COLLINS, JOHN (1625–83). An English mathematician, born at Wood Eaton, in Oxfordshire. He was a member (1667) of the Royal Society of London and wrote a number of works on algebra and dialing. Writers are much indebted to his *Commercium Epistolicum* (published by the Royal Society in 1712) for information on contemporary discoveries, as well as on the great controversy relating to the priority of Newton or Leibnitz in the invention of the calculus. Consult Rigaud, *Correspondence of Scientific Men of the Seventeenth Century* (Oxford, 1862).

COLLINS, JOHN CHURTON (1848–1908). An English educator and author. He was born at Bourton-on-the-Water, Gloucestershire, and graduated at Balliol College, Oxford, in 1872. He contributed largely to the reviews, strenuously opposing the philological method of literary study. In 1904 he became professor of English literature at the University of Birmingham. He is a writer of force, wit, and scholarship, with a lucid literary style. In 1908, while staying with a doctor to care for his broken health, he was found dead in a ditch, the verdict at the consequent inquest being that he died by accident. Besides editions of Cyril Tourneur (1878), Lord Herbert of Cherbury (1881), Robert Greene (1899), he published *Sir Joshua Reynolds as a Portrait Painter* (1874); *Bolingbroke and Voltaire in England* (1886); *Study of English Literature* (1891); *Dean Swift* (1893); *Essays and Studies* (1895); *Ephemera Critica* (1901); *Studies in Shakespeare* (1903); *Essays in Poetry and Criticism* (1905); *Rousseau and Voltaire* (1908). Consult L. C. Collins, *Life and Memoirs of J. Churton Collins* (1911).

COLLINS, JOSEPH WILLIAM (1839–1904). An American pisciculturist. He was born at Isleboro, Me. He prepared statistics on the New England fisheries for the tenth census and also submitted the results of his investigations to the United States Fish Commission. He represented the United States at the International Fisheries Expositions held at Berlin in 1880, at London in 1883, and at Bergen, Norway, in 1898; and he was director of the department of fisheries during the Columbian Exposition. In 1884 he organized the section of naval architecture in the United States National Museum and was curator of the department for nearly 10 years. He was appointed president of the Commercial Fisheries Association in 1894. He is author of several bulletins of the United States Fish Commission.

COLLINS, MORTIMER (1827–76). An English poet and miscellaneous writer, born at Plymouth. He was master of mathematics for a time at Queen Elizabeth's College, Guernsey, but resigned in 1856 and devoted himself thereafter wholly to literature. His publications include: *Idyls and Rhymes* (1865); *Who is the Heir?* (1865); *Sweet Anne Page* (1868); *The Secret of Long Life* (1871); *The British Birds, from the Ghost of Aristophanes* (1872); *Sweet and Twenty* (1875); *Fight with Fortune* (1875). His wife, Frances, published *Letters and Friendships of Mortimer Collins, with Some Account of his Life* (London, 1877).

COLLINS, PATRICK ANDREW (1844–1905). An American lawyer and politician, born in Fermoy, Ireland. He was brought to the United States in 1848 and settled in Chelsea, Mass., where he prepared himself for the study of the law. In 1871 he graduated at the Harvard Law School and was admitted to the bar. He was a member of the State Legislature in 1868–69 and State Senator 1870–71, served three terms in Congress (1883–89), and from 1893 to 1897 was Consul General at London. He was an active Fenian and was made first president of the Land League in 1884. He was elected mayor of Boston in 1901, was reëlected in 1902, and was serving at the time of his death.

COLLINS, REV. MR. A character in Jane Austen's *Pride and Prejudice.*

COLLINS, WILLIAM (1721–59). An English poet. He was born at Chichester, where his father was a hatter, and received his education at Winchester College and at Oxford. In 1742 he published a small volume containing the *Persian Eclogues,* in which he failed to escape from the poetical commonplace of his time, and in 1743 the *Epistle to Sir Thomas Hanmer.* Leaving Oxford, probably early in 1744, he went to London, resolved upon a literary career. Here, from time to time, he published other poems, consisting chiefly of odes; but misfortunes, occasioned by his indolence and irresolution, finally induced melancholy, which at times deepened into insanity. The poems which Collins left are comparatively few; but they entitle him to high rank among the poets of the eighteenth century. He was essentially a lyrist, and it is upon his odes that his reputation is principally founded. His most popular ode is *The Passions.* The personification of the passions is true and striking, and the variation of the measure is well adapted to the various emotions to be expressed. Among his poems may be mentioned the odes, *To Liberty, To Mercy, To Evening, On the Death of Mr. Thomson,* the ode, written in 1746, beginning, "How sleep the brave who sink to rest," and the *Song from Cymbeline.* Not only is much of Collins's poetry exquisite, but it is important as one of the early landmarks of English romanticism. This is particularly true of the *Ode on the Popular Superstitions of the Highlands of Scotland,* completed in 1749, but not published until 1788. Consult: Johnson, sketch of Collins in *Lives of the Poets* (Oxford, 1781); *Poems,* ed. Bronson (Boston, 1898), and ed. Stone (Oxford, 1907); Beers, *English Romanticism in the Eighteenth Century* (New York, 1899) and Millar, J. H., *The Mid-Eighteenth Century* (Edinburgh, 1902).

COLLINS, WILLIAM (1788–1847). An English genre painter and etcher. He was born in London and as a boy studied with Morland and later at the Royal Academy. Subsequently he went to Italy, where he painted Italian landscapes. His predilection, however, was for child life, which he painted in every phase and introduced into picturesque and minutely but somewhat weakly executed landscapes of village and beach. In the course of 40 years he exhibited 121 pictures at the Academy. The chief criticism against Collins's children is that they lack the unconscious air of childhood; their sweetness and charm too often degenerate into sentimentality. In later years he attempted

religious subjects, but without much success. Among his pictures in public museums are "Happy as a King" (Melbourne Gallery, Australia); "The Prawn Catchers" (1831); "Sunday Morning" (1836), and "Cromer Sands" (1845), in the National Gallery, London; "Rustic Civility," "The Stray Kitten," "Hull Sands," and others in the South Kensington Museum; "The Childhood of Wilkie Collins," in the Walker Gallery, Liverpool; "Children Fishing" and "Meadford Bay," in the Fitzwilliam Museum, Cambridge; and others in Dublin, Edinburgh, Manchester, and in several provincial museums. He was the father of Wilkie Collins, the novelist. Consult: W. Wilkie Collins, *Memoirs of the Life of William Collins, Esq.* (London, 1849); Koehler, *English and American Painters* (New York, 1888).

COLLINS, WILLIAM WILKIE (1824–89). An English novelist. He was the eldest son of William Collins (q.v.), a landscape and portrait painter, and he received his favorite name from Sir David Wilkie. Born in London, he was educated privately at Highbury and accompanied his father to Italy (1836–38). On his return to London he became a clerk in a London firm of tea merchants (1841–46) and afterward studied law at Lincoln's Inn, whence he was called to the bar (1851). He was already drifting towards literature. Even while in the London warehouse he turned his knowledge of Italy to good account in an historical romance entitled *Antonina; or, the Fall of Rome* (not published till 1850); on the death of his father he prepared an excellent memoir in 2 vols. (1849); and a visit to Cornwall resulted in a series of popular sketches called *Rambles beyond Railways* (1850–51). Some time in 1851 he met Dickens, and this event decided his career. Thenceforth the two novelists were intimately associated, working at times in collaboration. To *Household Words*, edited by Dickens, Collins contributed many tales, including the capital series of short stories known as *After Dark* (1856); and for *All the Year Round*, which was also conducted by Dickens, *The Woman in White* (1860), which met with instant success at home and abroad. In the meantime had appeared: *Basil: A Story of Modern Life* (1852): *Hide and Seek* (1854); *The Dead Secret* (1857); *The Queen of Hearts: A Collection of Stories* (1860). And among the numerous novels that followed are: *No Name* (1862); *Armadale* (1866); *The Moonstone* (1868); *Man and Wife* (1870); *The New Magdalen* (1873); *The Frozen Deep, and Other Stories* (1874); *The Law and the Lady* (1875); *The Two Destinies* (1876); *The Fallen Leaves* (1879); *Heart and Science* (1883); *The Legacy of Cain* (1888); *Blind Love* (1889). In 1873–74 Collins visited the United States, where he gave public readings from his own works. He died in London and was buried in Kensal Green.

Soon after his acquaintance with Dickens, Wilkie Collins began to evolve a new type of novel, in which the study of character counts for little, and in which the main effort is given to the construction of a mystery so involved in details and circumstances as to baffle the reader. Of this kind *The Woman in White* and *The Moonstone* are masterpieces. Within his sphere Collins had no equal among his contemporaries. Consult Swinburne, *Studies in Prose and Poetry* (London, 1894).

COLLINSON, PETER (1694–1768). An English naturalist. One of his pursuits was the naturalization of plants, flowers, and trees. He sent English plants to America and brought American plants to his own country, successfully introducing many species. Benjamin Franklin was indebted to him for his first information in 1745 regarding the progress of new electrical experiments in Europe.

COLLINSON, SIR RICHARD (1811–83). An English naval officer. He entered the navy in 1823, in 1840 was appointed to the *Wellesley*, on which he served during the Chinese War, and in 1842 was promoted to be commander of the *Bentinck*. In 1849 he commanded the *Enterprise*, which, with the *Investigator*, Commander McClure (q.v.), was sent by way of Bering Strait for the relief of Sir John Franklin. Collinson wintered in 1850 at Hongkong, in 1851 in Prince of Wales Strait, in 1852 in Cambridge Bay, and in 1853 in Camden Bay. He arrived at Point Barrow in August of 1854. In 1858 he was awarded the gold medal of the Royal Geographical Society. He was appointed admiral on the retired list in 1875, when he became K.C.B. He edited *The Three Voyages of Martin Frobisher in Search of a Passage to Cathaia* (1867), for the Hakluyt Society.

COL'LINSVILLE. A city in Madison Co., Ill., 10 miles east by north of East St. Louis, on the Vandalia Railroad (Map: Illinois, B 5). It is an important coal-mining centre and has a lead smelter and zinc works, cowbell factory, and knitting and flour mills. The city contains a hospital and tuberculosis colony, and owns its water works. Collinsville was settled in 1800 and was first incorporated in 1830. It is governed by a charter of 1872, which provides for a mayor, elected biennially, and a unicameral council. Pop., 1900, 4021; 1910, 7478.

COL'LINWOOD. Formerly a village in Cuyahoga Co., Ohio, annexed to Cleveland in 1908. It has railroad repair shops and a street-car manufactory.

COLLI'SION. See IMPACT.

COLLISIONS OF VESSELS (from Lat. *collisio*, from *collidere*, to dash together, from *con-*, together + *lædere*, to dash). To prevent vessels running against one another in passing, there are "rules of the road" (q.v.) at sea as well as on land. In both the United States and Great Britain regulations are laid down which, though not having the force of law, are recognized by the admiralty courts and govern the decisions in cases of collisions. In general, they are analogous to the rules observed by pedestrians in crowded thoroughfares and by vehicles on highways. It is at night that the danger of collision is greatest; and hence the necessity for a well-arranged system of lights and other precautions. Of 3575 casualties of all kinds on and near the coasts of the United Kingdom in 1880–81, 713 were due to collisions; of these 69 resulted in total loss. The transatlantic steamers running between Queenstown, or the Channel ports, and New York have adopted the "lane system," first advocated by Lieutenant Maury, U. S. N., and afterward developed by the Hydrographic Office, United States Navy, and approved by the Marine Conference held at Washington in 1889. This consists in the assignment of a definite lane or track to each separate line of steamships, along which route their vessels are required to maintain their course.

It has been held by American courts that, if a collision happens without fault, and no blame

can be charged to those in charge of either vessel, each party must bear its own loss. In case both parties are at fault, neither can have relief at common law; but maritime courts aggregate the damage to both vessels and their cargoes and divide the amount equally between the two. In case of inscrutable fault, i.e., by a fault of those in charge of one or both vessels, and yet under such circumstances that it is impossible to learn who is at fault, the rule of equal division is also adopted. Where the fault is on the part of one vessel and no fault on the other, the owners of the vessel at fault must bear their own loss and are also liable for the damage to the other vessel. In some cases the personal liability of owners is limited to the value of the vessel and freight. Strict laws, rules, signals, etc., are adopted by all nations to prevent collisions. (See NAVIGATION LAWS.) But, no matter how exacting may be the rules, cases will occur when their following would result in disaster. No vessel should unnecessarily incur the probability of collision by strict adherence to the rules. If it is clearly in the power of one vessel to avoid collision by departing from the rules, she will be held bound to do so; but a vessel is not required to depart from the rule when she cannot do so without danger. A proper lookout must be kept; the absence of such a lookout is in itself evidence of negligence. In some cases certain lights must be kept. Loss of a vessel injured by a collision is within the ordinary policy of insurance; but when the collision is the fault of the insured vessel, or of both vessels, the insurer is not ordinarily liable for injury done to the other vessel which may be decreed against the vessel insured, although recent policies provide that the insurer shall be liable in such case.

COLLITZ, HERMANN (1855–). An American philologist. He was born in Bleckede, Hanover, and was educated at Luneburg, Göttingen (Ph.D., 1879), and Berlin. He was assistant librarian (1883–86) and instructor in Sanskrit and comparative philology (1885–86) at the University of Halle. In 1886 he came to the United States. He was professor of German until 1897 and of comparative philology until 1907 at Bryn Mawr, and then became professor of Germanic philology at Johns Hopkins University. His earlier work was in comparative philology in general and Greek dialects in particular; his later in German philology. He published: *Sammlung der griechischen Dialektinschriften* (1884–1909; with Bechtel), including all of importance for dialect study; *Die Verwandtschaftsverhältnisse der griechischen Dialekte* (1895); *Die neueste Sprachforschung* (1886). He became an editor of *Modern Language Notes*, the *Journal of English and Germanic Philology*, and *Hesperia: Schriften zur germanischen Philologie;* and he contributed to the first edition of the NEW INTERNATIONAL ENCYCLOPÆDIA.

COLLITZ, KLARA HECHTENBURG (1863–). An American philologist, wife of Hermann Collitz. She was born at Rheyat, Rhenish Prussia, and was educated at Neuwied, Lausanne, the University of London, Oxford, and Heidelberg (Ph.D., 1901), specializing in linguistics. She lectured on French philology at Victoria College, Belfast (1895–96), on Germanic at Smith College (1897–99), and on the same subject for women students at Oxford (1901–04). She then returned to the United States. She wrote, besides contributions to periodicals, *Das Fremdwort bei Grimmelshausen* (1901), *Der Briefstil im 17. Jahrhundert* (1903), *Fremdwörterbuch des 17. Jahrhunderts* (1904), and edited *Selections from Early German Literature* (1910); *Selections from Classical German Literature* (1914).

COLLO'DION (Neo-Lat., from Gk. κολλώδης, *kollōdēs*, gluelike, from κόλλα, *kolla*, glue + εἶδος, *eidos*, form). A solution of pyroxylin in a mixture of alcohol and ether. For its manufacture a convenient form of cellulose, such as cotton wool, is immersed in a mixture of nitric and sulphuric acid with a little water, or in a mixture of potassium nitrate with sulphuric acid. The product is thoroughly washed in water and dried. The pyroxylin thus obtained is then treated with ether, to which alcohol is added until the substance is completely dissolved. The solution is a clear, colorless liquid that does not mix with water or alcohol, but readily mixes with ether; when exposed to the air, it dries up, leaving a transparent film, which becomes electric by friction and may be exploded by heat, pressure, or percussion. Mixed with substances sensitive to light, collodion is extensively used in photography; the mixture is spread over a glass plate, on which it forms, when dried, a sensitive film. Collodion is also used in surgery, the tenacious and transparent film left by its evaporation preventing the access of air to the injured surface and protecting it from infection. Pills and other medicinal preparations may be coated with it so as to render them tasteless. Among the medicinal collodions that are official is *blistering* or *vesicating collodion*, which consists of cantharides dissolved in collodion; the solution is applied to the skin when it is desired to raise a blister. Wood, paper, and fabrics may be rendered waterproof by being covered with collodion. Small balloons are made from it by pouring a solution into a flask of the desired dimensions, which is then turned about so as to spread the liquid uniformly over the surface and then inverted to allow the excess to run out. The solvent is then allowed to evaporate, and the edges of the remaining film are loosened from the glass by attaching a glass tube to the neck of the flask and withdrawing the air, whereupon the collodion balloon detaches itself, contracts, and is easily withdrawn. See also CELLULOSE and the references given under that head.

COL'LOIDS (from Gk. κόλλα, *kolla*, glue + εἶδος, *eidos*, form). A name applied by Graham to a group of substances, including ferric oxide, alumina, silicic acid, starch, dextrin, gum, albumin, gelatin, tannin, caramel, agar-agar, and others. These substances, though not by any means belonging to the same class chemically, behave alike in certain respects when obtained in solution in water or in some other solvent. In the first place, they diffuse, when dissolved, very much more slowly than most other substances ordinarily met with. In the second place, their presence in solution has scarcely any effect on the freezing point or on the vapor tension of the solvent, while most other substances have the effect of notably lowering both the freezing point and the vapor tension. Again, colloids often spontaneously deposit from their solutions in the form of gelatinous masses that cannot in many cases be redissolved and that usually retain mechanically a large amount of water. Such "gelatinized solutions" are now

used for a variety of purposes in the arts, advantage being taken of the mass being in a semi-solid condition, while the liquid retained by it may be used for the same purposes as when in the free state; such masses are used in photography by the "dry" process, in making "dry" electric batteries, in the manufacture of certain valuable explosives, etc. In scientific researches gelatinized solutions are now used for the purpose of studying the relative rates at which various substances diffuse in water. For this purpose it is important that the solutions should remain absolutely undisturbed for a considerable length of time, and this is accomplished best by adding to them a certain amount of agar-agar or some other colloid, and causing them to "gelatinize," the "dry" solutions thus obtained showing the same rates of diffusion as ordinary aqueous solutions. (See DIFFUSION.)

Another important property of colloids is their incapacity of traversing parchment paper and animal membranes. This permits of the separation of colloids from noncolloids (called "crystalloids") without any difficulty; the process of separation being known as *dialysis*. Thus, to dialyze a solution containing common salt (a crystalloid) and silicic acid (a colloid), the solution may be placed in a bag of parchment paper and immersed in pure water: the salt will then readily pass through the paper, while the silicic acid will remain behind.

The properties of colloids are undoubtedly due to the comparatively very large size of their molecules. Thus, while the molecular weight of water is only 18, and that of most organic substances only a few hundred, the molecular weight of dissolved starch has been shown to be about 25,000, and that of dissolved silicic acid is at least 50,000.

The particles of a colloidal substance in solution must thus be considered as made up, not of single chemical molecules, but of aggregates of them. And in many cases the aggregates, or "colloidal molecules," are large enough to be "seen" by the method of so-called *ultra*-microscopy. When, viz., a colloidal solution is examined microscopically by transmitted light, as usual, it appears as clear and homogeneous as water or, say, a solution of common salt. If, however, a powerful beam of light is directed into the colloidal solution sidewise, perpendicularly to the axis of the microscope, then the path of the ray becomes visible by reflection of the light from the colloidal particles, just as the path of a ray entering a darkened room through a small hole in a shutter is rendered visible by the dust particles in the air. In this manner Zsigmondy, in 1906, was able to discern colloidal molecules whose diameter was only *a few millionths of a millimeter*, or even only one-millionth. No wonder chemists are beginning to hope that the true chemical molecules themselves may yet actually be seen.

An interesting colloidal solution in the *solid* state of aggregation is constituted by ordinary ruby glass. When examined ultramicroscopically, ruby glass appears like a suspension of gold dust in a colorless transparent medium; yet by transmitted light the microscope shows it as no less homogeneous than ordinary colorless glass. Bredig in 1901, Svedberg in 1906, and others since, have also succeeded in obtaining colloidal solutions of metals in liquids, e.g., of gold, silver, and platinum in water, and of cadmium and even the alkali metals in organic solvents. Bredig's method consisted in establishing an electric arc between electrodes of the metal whose solution was desired, under the surface of the solvent, the direct current being used. Svedberg used the alternating current and kept the solvent during the operation at a low temperature. All the metal solutions so obtained looked perfectly homogeneous under the microscope, though more or less strongly colored; the ultramicroscope, however, showed plainly the colloidal molecules distributed throughout their volume like fine dust. Zsigmondy has shown that the colloidal molecules of all such solutions, whether the dissolved colloid be a metal or not, are constantly vibrating ("Brownian movement," so called after the English botanist Brown, who as far back as 1827 observed the continual vibration of fine particles of solids suspended in liquids), and in the case of the finest visible molecules he has also observed a secondary, translatory motion. It has since been demonstrated, by Perrin and others, that these movements are in complete accord with the kinetic theory of gases and that the colloidal molecules obey the gas laws in every respect, so that the movements themselves are nothing else than the molecular motion which has long been assumed to constitute heat. Thus the study of colloidal solutions has in recent years turned the kinetic hypothesis of heat into practically a fact.

We have seen that the colloidal molecule is really a complex made up of a large number of the minuter chemical molecules. It seems probable that some of these component particles of the colloidal molecule are electrically charged ions (see DISSOCIATION, *Electrolytic*), and that unless ions formed part of their composition they could not exist in solution at all, but would form coarser conglomerates and "precipitate out," or, in the case of very fine suspensions, "settle out." That colloids in solution carry electric charges, is indicated by the fact that when the terminals of an electric battery are introduced into a colloidal solution, the colloid migrates in the direction of one of the terminals: ferric hydrate, e.g., moves in the direction of the current; colloidal platinum, silicic acid, and other substances, move *against* the current. In suspensions such movements caused by the electric current were first observed by Quincke in 1861—a phenomenon referred to as *cataphoresis*. That, unless charged, colloids cannot remain dissolved, is indicated by Picton and Linder's rule, according to which colloids which migrate, under the influence of the current, in opposite directions, cause each other's precipitation if their solutions are mixed: plainly, colloids which migrate in opposite directions must be charged with the opposite electricities; when mixed, they neutralize each other's charge, and since precipitation is the result, the inference is justified that the electric charge is indispensable to the existence of either colloid in the dissolved state. If this view is correct, then we are justified in expecting that a certain definite quantity of one colloid will be necessary and sufficient completely to precipitate another; for electric neutralization can only set in when the opposite charges brought together are equal. That this is really the case, was shown by Biltz in 1904. Colloidal gold travels *against* the current; colloidal zirconium hydroxide travels *with* the current. When to a gold solution containing

1.4 milligrams of the metal Biltz added gradually increasing amounts of the zirconium hydroxide, he found that complete precipitation occurred only when 1.6 milligrams of the latter had been added; when the amount added was only 0.065 milligram, no precipitation could be observed. On the other hand, when to a similar amount of colloidal gold as before he added at once as much as 16.2 milligrams of the precipitating colloid, the mixed solution remained clear, the charge carried by the zirconium hydroxide being in this case sufficient, not only to neutralize the opposite charge of the gold, but also to maintain in solution the resulting colloidal mixture.

Bibliography. The literature on colloidal solutions—or "disperse systems," as they are now frequently called—is yearly growing more and more extensive. A summary may be found in Freundlich, *Kapillarchemie* (Leipzig, 1909). Consult also: Lottermoser, *Anorganische Kolloide* (Stuttgart, 1901); Bredig, *Anorganische Fermente* (Leipzig, 1901); Müller, *Theorie der Kolloide* (ib., 1903); Zsigmondy, *Zur Erkenntnis der Kolloide* (Jena, 1905); Perrin, *Les atomes* (Paris, 1913).

COLLOPH'ANITE (from Gk. *κόλλα, kolla*, glue + *φαίνειν, phainein*, to show). Amorphous hydrated calcium phosphate. It has a banded structure, resembling opal, and a conchoidal fracture. In color it is snow-white or yellowish white. This mineral is found chiefly on the island of Sombrero, having been formed in the elevated coral reef by infiltration of salts from the overlying guano.

COL'LOP MONDAY. An old English phrase used to designate the Monday before Lent, from the custom of those days (when fasting was more strictly observed than at present) of cutting meat into strips or collops and salting it to keep till after Lent.

COLLOT D' HERBOIS, kô'lô' dâr'bwä', JEAN MARIE (1750–96). A French Revolutionist. He was born in Paris and passed his early life as an actor. After visiting Holland and acting as the director of a troupe at Geneva, D'Herbois took to playwriting. Most of his productions were adaptations from English and Spanish, and one, *Le paysan magistrat* (1777), was popular for a time. In 1789 D'Herbois, who was then living in Paris, wrote *La famille patriot ou la fédération*, a Revolutionary drama, and followed up this success by bringing out the *Almanach du Père Gérard*, for which he was awarded a prize by the Jacobin Club. Elected as the third deputy from Paris to the Convention in 1792, he became in the following year president of that body and a member of the Committee of Public Safety. In November, 1793, he was sent to Lyons to complete the work of pacification begun by Couthon. There he showed himself merciless in the service of the Republic and caused 1600 persons to be put to death. On returning to Paris he found himself, owing to his popularity, an object of suspicion to Robespierre, and, after an attempt to assassinate him had failed, Robespierre's jealousy increased. Collot d'Herbois took part in the conspiracy which led to Robespierre's downfall, but the reaction was fatal to himself. He was expelled from the National Convention, and in April, 1795, was sentenced to deportation to Cayenne, where he died of fever, Jan. 8, 1796. Consult: Aulard, *Les orateurs de la Législative et de la Convention* (Paris, 1885–86); Morse-Stephens, *The French Revolution* (London, 1891) and *Statesmen and Orators of the French Revolution* (Oxford, 1892).

COLLU'SION (Lat. *collusio*, from *colludere;* to defraud, to play together, from *con-*, together + *ludere*, to play). In law, a species of fraud (q.v.), consisting in an agreement between two or more persons to defraud a third, or to accomplish some illegal purpose; thus, it is collusion for a failing debtor to transfer property to another, who receives it to enable him to defraud some or all of his creditors; or for husband and wife, by mutual agreement or understanding, to institute a suit to procure a divorce without legal cause. Such transactions or proceedings are voidable because of their fraudulent character.

COLLU'THUS, or COLUTHUS (Lat., from Gk. *Κόλλουθος, Kollouthos*). A Greek poet of the fifth century, a native of Lycopolis in Upper Egypt. He wrote various works, on the hunt of the Calydonian Boar (q.v.), the Persian wars, etc. Only one is extant, a poem in 392 hexameters, entitled *Ἑλένης Ἁρπαλή, Helenēs Harpalē*, or the *Rape of Helen*, which was discovered by Cardinal Bessarion in Calabria. The versification is good, but the poem is, on the whole, a poor imitation of Homer, without imagination. The text has been edited by Lehrs in the Didot collection (1841), and by Abel (1880).

COLL'YER, ROBERT (1823–1912). An American clergyman of the Unitarian church. He was born at Keighley, Yorkshire, England; at eight years of age he was a mill hand; at 14, a blacksmith; and in 1849 he became a local preacher of the Methodist church. In 1850 he came to America and began work as a hammer maker at Shoemakersville, Pa. His license as a Methodist minister was revoked, partly for his preaching against slavery. In 1859 he joined the Unitarian church and went to Chicago as a missionary of that denomination and shortly after organized and became pastor of Unity Church. He was prominent during the Civil War in the work of the Sanitary Commission. He was called in 1879 to the Church of the Messiah, New York City, of which, after a successful active pastorate, he was senior associate minister from 1903 until his death. His publications include: two volumes of sermons, *Nature and Life* (1865; 11th ed., 1882) and *The Life that Now Is* (1871; 10th ed., 1882), written in a style noteworthy for its effective Anglo-Saxon vocabulary; *The Single Truth* (1877); *History of Ilkley* (1883; with Horsefall Turner); *Things New and Old* (1893); and *Clear Grit* (1914), a collection of lectures, addresses, and poems, edited by J. Havnes Holmes.

COLM, SAINT. See COLUMBA, SAINT.

COLMAN, kō'lman, BENJAMIN (1673–1747). An American Congregational clergyman, prominent in the Colonial period. He was born in Boston, graduated at Harvard in 1692, preached and studied theology for three years, and spent the years 1695–99 in England, After his return he became first pastor of the newly organized Brattle Street Church, a position which he filled until his death. He was opposed by Increase and Cotton Mather (qq.v.), who insisted that his ordination, in England and by Presbyterians, was irregular. He exercised a great influence both in religious and secular affairs and was a popular preacher. In 1724 he re-

fused the presidency of Harvard College. He aided in the foundation of Yale. Besides a collection of sermons, in 3 vols. (1707–22), he published a number of poems and a pamphlet advocating inoculation for the smallpox. Consult Turell (Colman's son-in-law), *Life and Character of Benjamin Colman* (Boston, 1749).

COLMAN, GEORGE, called THE ELDER (1732–94). An English dramatic author and theatrical manager. He was born in Florence, was educated at Oxford, and was called to the bar in 1755, but soon abandoned law for literature. In 1760 his first dramatic piece, entitled *Polly Honeycomb*, was produced at Drury Lane with great success. This comedy was followed the next year with *The Jealous Wife*, and in 1766 with *The Clandestine Marriage*, written in conjunction with Garrick. In 1767 he became one of the purchasers of the Covent Garden Theatre and held the office of acting manager for seven years. In 1777 he purchased the Haymarket Theatre. Colman wrote and adapted upward of 30 dramatic pieces. He also translated Terence, edited Beaumont and Fletcher, and wrote considerable other verse and prose. Consult George Colman (2d), *Random Records* (1830), and Peake, *Memoirs of the Colman Family* (London, 1841).

COLMAN, GEORGE, called THE YOUNGER (1762–1836). An English dramatist and miscellanist, son of George Colman. His bent lay in the same direction as his father's, during whose last years he acted as manager of the Haymarket Theatre. On the death of the elder Colman, George III transferred the patent to his son. After 1824 Colman held the office of examiner of plays. In industry he rivaled his father, and he received large sums for his plays, of which the best known are *John Bull* and *The Heir-at-Law*. He wrote many humorous poems, among which were *Broad Grins* (1802) and *Poetical Vagaries* (1812). In 1830 he published an amusing autobiography, *Random Recollections*.

COLMAN, NORMAN J. (1827–1911). The first Secretary of Agriculture of the United States. He was born on a farm near Richfield Springs, N. Y., May 16, 1827. In 1847 he removed to Louisville, Ky., and he afterward practiced law in New Albany, Ind., and in St. Louis, Mo. He served in the Union army during the Civil War as lieutenant colonel of volunteers. In 1865 he established an agricultural paper, *Colman's Rural World*, which he continued to edit to the close of his life. In 1874 he was elected Lieutenant Governor of Missouri and in 1885 was appointed United States Commissioner of Agriculture. Towards the end of his term he was appointed Secretary of Agriculture, under the law reorganizing the Department of Agriculture.

COLMAN, SAMUEL (1832–). An American landscape painter. He was born in Portland, Me., and studied first in New York under Durand and later in France, Spain, Rome, and Dresden. After traveling extensively he returned to New York and was one of the founders of the American Water-Color Society, and its first president (1866–67). His early landscapes are in the style of the Hudson River school (q.v.), but later show the influence of Turner and Achenbach. They display no special originality or technical ability, but are mellow in tone and good in color. Examples of his work are found in the Metropolitan Museum, New York, and in the Art Institute, Chicago. Consult his biography by Koehler, in *American Art Review* (Boston, 1880), and Isham, *History of American Painting* (New York, 1905).

COLMAR'. See KOLMAR.

COLNE, kōln *or* kōn. A market town of Lancashire, England, on a branch of the Calder, 32 miles north of Manchester (Map: England, D 3). Colne was incorporated in 1895, has an excellent modern system of sewage disposal, and maintains a public library, markets, and slaughterhouses. It has manufactures of cotton, calicoes, and mousselines de laine. There are also numerous collieries and limestone and slate quarries in the vicinity. Pop., 1901, 23,000; 1911, 25,689. Colne is very ancient and is supposed by some to be the *Colunio* of the Romans.

COL'OCA'SIA. See COCCO; TARA; TARO.

CO'LOCO'LO. A wildcat of South America, related to the ocelot (q.v.).

CO'LOCOTRO'NIS. See KOLOKOTRONIS.

COL'OCYNTH (OF. *coloquinte*, from Lat. *colocynthis*, from Gk. κολοκυνθίς, *kolokynthis*, colocynth, from κολοκύνθη, *kolokynthē*, pumpkin), or BITTER APPLE. A well-known medicine, much used as a purgative. It is the dried pulp of the colocynth gourd, colquintida, bitter apple, or bitter cucumber, a globose fruit about the size of an orange, of a uniform yellow color, with a smooth, thin, solid rind. The plant which produces it, *Citrullus colocynthis*, is allied to the cucumber (q.v.). It is common in Turkey, the Grecian Archipelago, various parts of Asia, and in Africa and Spain, which last country supplies no small part of the colocynth of commerce. The fruit is gathered when it begins to turn yellow, peeled, and dried quickly either in a stove or in the sun. It is chiefly in the form of a dry extract that it is used in medicine. It owes its properties to a bitter principle called *colocynthin*, a bitter glucoside having the chemical formula $C_{56}H_{84}O_{23}$. It is a curious, though not unique, fact that the seeds of the colocynth plant, produced in the midst of its medicinal pulp, are perfectly bland, and they even form an important article of food in the north of Africa. The name "false colocynth" is sometimes given to the orange gourd (*Cucurbita aurantia*), sometimes cultivated as an ornamental plant in our gardens, on account of its globose, deep-orange fruit. The pulp of the fruit possesses the properties of colocynth, but in a milder degree. Colocynth is generally administered in the form of pills, in which the extract is associated with aloes, scammony, and in some cases with calomel or with extract of hyoscyamus. In small doses colocynth acts as a safe and useful purgative; when accompanied by hyoscyamus, the latter prevents much of the pain and griping which are attendant on the use of colocynth by itself. It is a drastic purgative, acting upon the whole intestine, and is used only in obstinate cases of chronic constipation. Colocynth is an ingredient of some powders for destroying moths. In large doses colocynth is a poison, causing severe inflammation of the stomach and intestine. The medicinal dose is from 2 to 8 grains; that of the official extract from ½ to 2 grains; that of the compound extract from 5 to 15 grains.

COLOGARITHM. See ARITHMETIC COMPLEMENTS.

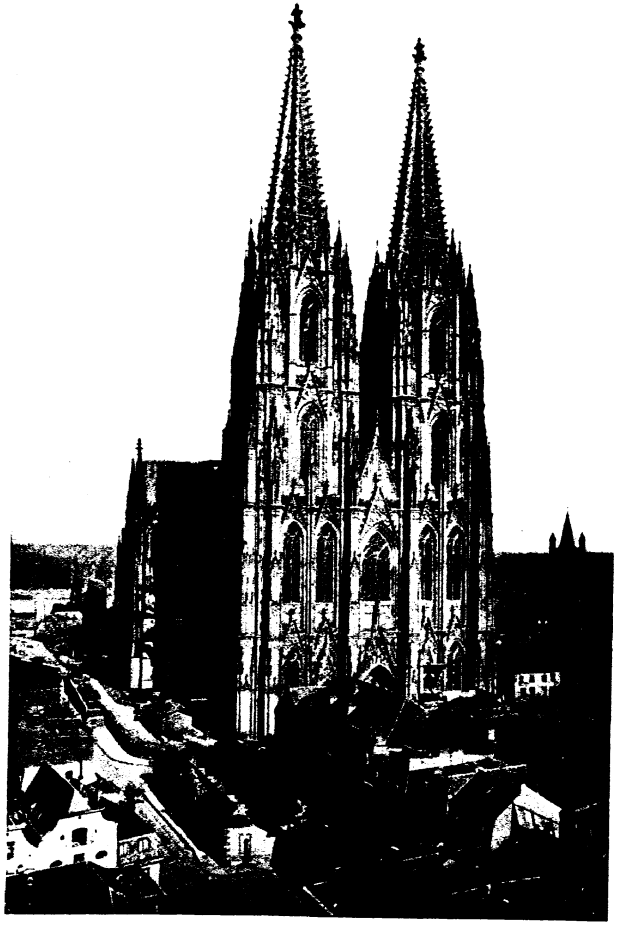
COLOGNE, kō-lōn' (Ger. *Köln*, officially *Cöln;* the *Colonia Agrippina* of the Romans).

The largest city of Rhenish Prussia, and the sixth largest in Germany, on the left bank of the Rhine, in lat. 50° 56′ N., long. 6° 58′ E. (Map: Prussia, B 3). It is 44 miles by rail northeast of Aachen, 57 miles north-northwest of Coblentz, and 24 miles southeast of Düsseldorf. Cologne is a fortress of the first rank, its fortifications forming a semicircle, with the Rhine as its chord, and the former town of Deutz (since 1888 included in Cologne) on the opposite bank, as a tête-de-pont. It is connected with this suburb by a bridge of boats and a splendid iron bridge for railway and wagon traffic, completed in 1910 and replacing the notable iron bridge built in 1855–59. Still another bridge was completed in 1910, for railway and wagon traffic, at the southern end of the city. In the old quarter the streets are narrow and crooked, but the main residential quarter presents a thoroughly modern aspect. The Ringstrasse, a stately boulevard, nearly 4 miles long, occupies the site of the ancient walls, dismantled in 1881–85. A new line of fortifications established beyond the Ringstrasse embraces 1000 acres and has nearly doubled the city's area.

Among the public buildings the churches claim the greatest share of attention, the splendid specimens of the Romanesque period being more numerous than in any other city in the world. The oldest is perhaps the church of St. Gereon, said to have been founded by the Empress Helena; the choir, with its two square towers, was added in the eleventh century, and the decagonal nave dates from 1219–27. St. Maria im Capitol, consecrated in 1049 and considered by some as the oldest church in Cologne, is a cruciform basilica of imposing appearance. The interior is decorated with fine frescoes. The Apostles' Church, a remarkably fine basilica, presents the best specimen of the highly developed style of architecture in which ecclesiastical enthusiasm and civic love of splendor found expression towards the end of the twelfth century; and the church of St. Cunibert, dating from 1247, is a prominent example of the Byzantine-Moorish style. The church of St. Martin was consecrated in 1172; its massive eastern portion has an imposing tower, 270 feet high. The Jesuits' Church, erected in 1618–29, may be mentioned as an excellent specimen of the mingled style peculiar to that order. The church of St. Peter, in late Gothic style, is celebrated for the altarpiece of the crucifixion of St. Peter by Rubens, and that of the Minorites for containing the tomb of the famous scholastic Duns Scotus. St. Ursula is another church of historic interest. Most of these edifices underwent complete restoration during the nineteenth century. The newer ecclesiastical edifices include a handsome Roman Catholic church in Deutz (1896) and a large synagogue in the new section west of the Ringstrasse (1899).

The Cathedral. The chief object of interest in the city, however, as well as its greatest ornament, is the cathedral, Germany's grandest church building, and one of the noblest specimens of Gothic architecture in Europe. It is said to have had its origin in a structure erected at the beginning of the ninth century by Archbishop Hildebold. This was burned in 1248, and the present cathedral was begun in the same year by Archbishop Konrad von Hochstaden. The design is modeled upon that of Amiens Cathedral, and the architect may have been Master Gerhard von Rile, who is mentioned as conducting the building operations. The choir, the first part completed, was consecrated in 1322. The work was carried on intermittently till the era of the Reformation, when it was suspended, and during the subsequent centuries not only was nothing done to advance it, but the uncompleted structure was suffered to decay. In the beginning of the nineteenth century, however, attention was attracted to its incomplete state, especially by the brothers Boisserée (q.v.); and it became the subject of an enthusiasm extending over all Germany, giving birth to a multitude of associations for the supply of the necessary funds to repair and complete it according to the original designs, which had fortunately survived. On Sept. 4, 1842, the King of Prussia, who had contributed largely to the funds, laid the foundation stone of the transept, from which time great progress was made. The naves, aisles, and transepts were completed in 1848, the magnificent south portal in 1859, and in 1860 the iron central spire was added. With the exception of the towers, the whole was finally completed in October, 1863. The towers, its most impressive and dominating feature, were finished in 1880, and on the 15th of October the completion of this grand work was celebrated with great splendor in the presence of Emperor William I and most of the sovereign princes of the German Empire. The cathedral has a length of 443 feet and a width of 200 feet; the height of the roof is 201 feet, that of the central tower over the crossing 357 feet, and of the two main towers 512 feet. The great bell of the south tower, the "Kaiserglocke," cast in 1874 from conquered French cannon, is the largest and heaviest in the world. The interior is particularly impressive by reason of its soaring height, and the stained glasses are among the finest modern specimens of that art in Germany. It contains the relics and shrine of the "Three Magians," which, since their acquisition in 1164, have been the goal of countless pilgrimages. Consult the monumental monograph on Cologne Cathedral by Boisserée (Munich, 1842), and those of Fahne (Düsseldorf, 1849), Bock (Cologne, 1874), Schmitz (ib., 1868–76), Lamprecht (Bonn, 1881), Wiethase (Frankfort, 1884–89), and Helmken (Cologne, 1899).

The most noteworthy secular edifices are: the Rathaus, the central and oldest portion of which dates from the fourteenth century and contains the handsomely restored Hansa Saal, in which the first general meeting of the Hanseatic League was held in 1367. The graceful portico in Renaissance style and the splendid five-storied tower deserve attention. South of the Rathaus rises the imposing structure of the Gürzenich, erected in 1441–52 as a festive hall for the entertainment of distinguished guests by the City Council, and first used for that purpose at the grand festival held in honor of Emperor Frederick III in 1475. Thoroughly renovated in 1856, it is now the most splendid among the old secular structures, and since 1875 has been used as a stock exchange. The Templars' Lodge, the ancestral seat of the Overstolzen, a distinguished family of mediæval Cologne, is a fine Romanesque building of the twelfth or thirteenth century, now used by the Chamber of Commerce. Of the numerous modern public buildings the most prominent are: the palatial government buildings (1830); the Municipal Museum





COLOGNE

CATHEDRAL RATHAUS

(1855–61); the Stadttheater (1872); the Court of Justice (1886–93), an extensive Renaissance structure, with an impressive façade and handsome staircase; the imposing new post office (1893); and the Imperial Bank (1897). A handsome central railway station was built in 1889–94. The city contains many fine monuments, including statues of Frederick William III, Johann von Werth, and Bismarck.

Cologne is administered by an *Oberburgermeister*, appointed for a period of 12 years and assisted by 11 associates. The municipality operates successfully its own gas and water works, as well as an electric-lighting plant. The street railways are operated by a private company, whose franchise expires in 1916, when the lines will be turned over to the municipality without compensation. The municipality also owns and maintains a pawnshop and slaughterhouses. The educational establishments of Cologne include four gymnasia, a realgymnasium, an oberrealschule, and a realschule; also an academy of medicine, a commercial high school, a theological and a teachers' seminary, a conservatory of music, and a girls' gymnasium. The municipal library contains over 185,000 volumes, and the museum has a number of valuable collections. The zoölogical garden, opened in 1860, is one of the finest in Europe. The industries of Cologne are extensive and varied. The industrial establishments include sugar refineries, chocolate factories, cigar factories, tanneries, machine shops, paper mills, flour mills, breweries, distilleries, and several factories producing the celebrated eau de Cologne. The commerce, both by rail and by Rhine steamboats, is very great. A fine modern harbor, with extensive quayage, has been constructed. The population of Cologne has greatly increased since 1888, when outlying districts began to be annexed to the city. In that year the population numbered 144,772; it rose to 281,681 in 1890, and 372,229 in 1900. The census of Dec. 1, 1910, returned 516,527 inhabitants (about five-sixths Roman Catholics); the area of the city at that time was 117 square kilometers (45 square miles).

Cologne was originally a town of the German tribe of the Ubii (*Oppidum Ubiorum*). It received the name of Colonia Agrippina, 50 A.D., from Agrippina, the wife of the Emperor Claudius, who planted a colony of Roman veterans on the spot, which was her native place. It grew to be an important city under the Romans and retained its prominence under the Frankish sway. The bishopric of Cologne, instituted in Roman times, was elevated to the rank of an archiepiscopal see by Charles the Great in 785. At this time the city was a busy seat of commerce. It entered the league of the Hansa towns in the beginning of the thirteenth century and contended with Lübeck for the first rank. The archbishops acquired considerable territory, and some of them distinguished themselves as politicians and warriors. They took their places among the great princes and electors of the Empire, but were involved in a protracted contest with the citizens of Cologne, who successfully asserted against them the independence of the city. Within the city a bitter contest was carried on all through the Middle Ages between the small number of merchant princes and the trade guilds. The Reformation made little progress in Cologne, and the Protestants were treated with intolerance. With the sixteenth century began a process of steady decline, which remained unchecked till after the end of the Napoleonic wars, when a new period of industrial prosperity set in. In the course of the wars of the Revolution the city lost its independence, to become part of France, and on the downfall of Napoleon it was annexed to Prussia. The archbishopric was secularized in 1801–03, and the Congress of Vienna assigned all of its territories to Prussia. A new archiepiscopal see was created in 1824. Consult: Ennen, *Geschichte der Stadt Köln* (5 vols., Cologne, 1862–80); Heldmann, *Der Kölngau und die Civitas Köln* (Halle, 1900); Binterim and Moosen, *Die Erddiözese Köln bis zur französischen Staatsumwalzung* (2 vols., Düsseldorf, 1892–93); *Die Chroniken der niederrheinischen Städte: Cöln* (3 vols., Leipzig, 1875–77).

COLOGNE, EAU DE. See EAU DE COLOGNE.

COLOGNE, THE THREE KINGS OF. The three wise men, or magi, by name Melchior, Kaspar, and Balthazar, who followed the star from the East to where it rested above the new-born Jesus. Their bones are said to have been placed in Cologne Cathedral, and their skulls were exhibited there as late as the eighteenth century. Those who touched them were supposed to be healed of their diseases. The names of the three kings were also used as a charm.

COLOGNE YELLOW. A yellow pigment made by precipitating a mixture of lead and calcium nitrates with sodium sulphate and potassium chromate. It is essentially a chrome yellow in which the intensity of the color is lessened by the calcium salt.

COLOMB, kô-lôm′, PHILIP HOWARD (1831–99). A British admiral, born in Galloway, Scotland, the son of an army officer. He entered the navy in 1846 and saw varied service, against Chinese pirates in 1848–51, in the Burmese War in 1852, in the Arctic relief expedition of 1854, in the English attack on Sveaborg in 1855, and in suppressing the slave trade in 1868–70—the subject of his interesting book *Slave-Catching in the Indian Ocean* (1873). After his superannuation (1886) he became rear admiral (1887) and vice admiral (1892). In 1858–67 he attempted to make the Real cone signals practical, and, failing, perfected the system of flash signals adopted by the British navy in the latter year. He did equally important work in revising evolutions for steam warships, and the Washington Conference of 1889 adopted a code of marine regulations based upon his study of maritime collisions and contradictory "rules of the road." His great book on *Naval Warfare* (1891; 3d ed., 1900) developed independently the same thesis as Captain Mahan's works on sea power—the prime importance of the command of the sea. He wrote *Memoirs of Sir Astley Cooper Key* (1898).

COLOMBA. See CALUMBA.

COLOM'BA. A story of Corsica, by Prosper Mérimée (1840). It is considered his masterpiece.

COLOMBAT DE L'ISÈRE, kô'lôN'bà' de lē'zâr' (1798–1851). A French physician, born at Vienne, Department of Isère. He devoted himself to the study of defects of speech and established in Paris an institute for the correction of stuttering, on the principle of rhythmic pronunciation. His best-known work, entitled *Traité de tous les vices de la parole et en particulier du bégaiement* (1830), passed through several editions. He wrote also *Traité des maladies des femmes et de l'hygiène spéciale de leur*

sexe (1839–43); and *Memoire sur l'histoire physiologique da la ventriloquie* (1840). In recognition of his fruitful services the Academy of Sciences awarded him a prize of 50,000 francs.

COLOMBES, kô'lôNb'. A town in the Department of Seine, France, suburban to Paris, 3 miles northwest of the city walls. It has manufactures of starch, gelatin, oil, vinegar, measuring instruments, and woolens; there are also petroleum refineries, etc. Pop., 1901, 23,061; 1911, 22,862.

COLOM'BIA (so called in honor of Christopher Columbus). A republic in South America, occupying the northwest corner of the continent and bounded by the Caribbean Sea and Venezuela on the north, Venezuela and Brazil on the east, Ecuador on the south, and the Pacific and the Republic of Panama on the west. It lies between lat. 3° S. and 12° 30′ N. and between long. 67° 30′ and 83° W. The area was estimated in the census of 1912 at 461,606 square miles.

Topography. Colombia may be divided into two natural regions—the Andean Cordilleras and the great plains or llanos of the east. Entering Colombia from Ecuador, the Cordilleras are continued in a general northerly direction by three diverging ranges, which spread out over the entire western section of the country. The Western Cordillera constitutes a long mountain ridge, with summits 10,000 to 11,000 feet in altitude, which is defined on the east by the valley of the Cauca River. In the northern part the chain is flanked on the west by the Cordillera del Chocó. The Central Cordillera, the continuation of the Eastern Cordillera of Ecuador, contains the highest peaks in Colombia, including the volcanoes Huila, Puracé, and Tolima, the last reaching an altitude of 18,432 feet. The Eastern Cordillera, separated from the central range by the Magdalena River, attains an extreme elevation of 16,700 feet and has great table-lands that are the most thickly populated regions in the republic. This chain divides at the north, the eastern range extending into Venezuela, and the western, known as the Sierra de Perijá, running northward and merging into the Sierra Nevada de Santa Marta, near the coast. The llanos east of the Cordilleras have a surface tilted towards the Atlantic. They cover the northeastern portion of Colombia, comprising the entire basin of the Meta River and extending as far south as the Guaviare River. Their grazing land is rich and well watered. The forest belt lies south of these plains.

Colombia has a coast line of over 3600 miles, of which more than 1600 miles are on the Pacific. Omitting minor sinuosities the Pacific coast line is about 500 miles and that of the Caribbean about 700. The shores are very irregular and form better harbors on the west than on the north. The region abounds in long rivers. The Magdalena traverses the country through almost its entire north-south length and receives numerous tributaries. Navigation is occasionally impeded by rapids. La Dorada is its head for steamers, although the river is navigable for 900 miles from its mouth. The Atrato flows north not far from the west coast and enters the Gulf of Darien. The eastern plain, belonging to the basins of the Orinoco (which forms part of the eastern boundary) and the Amazon, is crossed by many long rivers. The chief affluents of the Orinoco are the Guaviare and the Meta; of the Amazon, the Uaupés and the Yapurá (or Caquetá).

In the Cordilleras the climate is moderate in the upper regions, but very hot in the valleys. The belt of greatest heat lies south of the llanos. On the table-lands of the Cordilleras the mercury occasionally falls as low as 44° F. In the mountainous parts there are two rainy seasons; on the coast rains occur at any time of the year. Generally speaking, the country is healthful.

Flora. In the low regions plant life is purely tropical. Palms are very numerous and include the lofty wax palm (*Ceroxylon andicola*). Of the more useful forest trees of this region is the rubber (*Castilloa elastica*). The mountain slopes are mostly clothed with thick forests, the timber line being above 10,000 feet. Dye and cedar woods, as well as copaiba trees, grow naturally in Colombia. Cinchona trees of several species are found between 7000 and 9000 feet above the sea, and the aloe, the sarsaparilla, and other medicinal plants grow in abundance. Cacao is cultivated mainly in the provinces of Cauca and Tohina. Other Colombian products are coffee, sugar, and indigo. Cotton and tobacco are also grown.

Fauna. The fauna is also of great variety and includes the larger South American mammalian types, such as the jaguar, puma, tapir, anteater, sloth, several species of monkey, and one or more species of red deer (on the plateaus). The condor, vulture, numerous toucans and parrots, and a variety of humming birds are a part of the rich avifauna. Serpents of several kinds are found in the torrid regions. Fishing is carried on along the banks of the Magdalena and Orinoco.

Geology. The mountain regions here have long been the seat of great volcanic activity. The chief formations in the central range are granite, gneiss, basalt, and eruptive rocks, while in the eastern range Cretaceous formations predominate. The entire portion east of the Cordilleras is occupied by the llanos—vast treeless plains having an altitude of from 1000 to 1500 feet and well adapted for pasturing.

Mineral Resources. Colombia is very rich in minerals, especially in precious metals. Gold is found mostly in alluvial deposits and in the streams. During the Spanish régime the proceeds from the gold mines constituted the chief revenue, but the extracting was carried on by most primitive means. Modern methods were introduced only during the last quarter of the nineteenth century, though the principal mines have long been operated by English companies. The chief centre of gold mining is Antioquia. The leading silver mines are in Tolima and Cauca. The annual gold output of the country amounts to over $3,000,000. The other mineral resources—iron, copper, platinum, lead, and salt—are little developed. Emeralds are mined in the Department of Boyacá, the mines of Muzo and Cosquez being the most noteworthy. Salt mining, a government monopoly, is carried on chiefly around Zipaquirá and Nemocón, in Cundinamarca, where salt is found both in rock form and in springs. Coal exists in the Eastern Cordillera and in many other parts, but is as yet scarcely touched.

Agriculture. The principal industry of Colombia is agriculture, which is greatly favored by the soil and climate, but is carried on by primitive methods. Cultivation is confined mainly to the elevated plateau of the western part, which is best adapted to settlement by

SOUTH AMERICA
NORTHERN PART

SCALE OF STATUTE MILES
0 50 100 200 300 400 500

SCALE OF KILOMETERS
0 100 200 300 400 500 600 700 800

Important towns are shown in heavy face type

Railways shown thus ——

PROVINCES IN EQUADOR

1. Esmeraldas
2. Carchi
3. Imbabura
4. Manabi
5. Pichincha
6. Leon
7. Rios
8. Bolivar
9. Tunguragua
10. Gunyas
11. Chimborazo
12. Canar
13. Azuay
14. El Oro
15. Loja
16. Oriente

RIO DE JANEIRO

SCALE OF MILES
0 1 2 3

L.L. POATES, ENGR'G CO., N.Y.

and $14,060,294. The departments are independent in their internal financial affairs and derive their revenues chiefly from monopolies. The currency of the country consists of the depreciated paper pesos. The gold peso is equivalent to the United States gold dollar, the silver peso fluctuates with the price of silver, and the paper peso is legally current at one cent.

Population. The census of 1870 returned a population of 2,951,323. From that time no census was taken until March 5, 1912, for which date the population is returned at 5,472,604. The latter figure includes an estimated 400,000 for Panama, sovereignty over which Colombia still claimed. On the other hand, it does not include a considerable number of uncivilized Indians; the number is quite unknown, but has been surmised to be about 30,000. Population by departments, etc., according to the 1912 census, is as follows:

	Sq. miles	Pop.	Capitals
Departments:			
Antioquia	22,752	740,937	Medellín
Atlántico	1,008	114,887	Barranquilla
Bolívar	22,320	420,730	Cartagena
Boyacá	16,460	586,499	Tunja
Caldas	7,380	341,198	Manizales
Cauca	20,403	211,756	Popayán
Cundinamarca	8,046	713,968	Bogotá
Huila	8,100	158,191	Neiva
Magdalena	19,080	149,547	Santa Marta
Nariño	9,360	292,535	Pasto
Norte de Santander	6,255	204,381	Cúcuta
Santander	17,868	400,084	Bucaramanga
Tolima	10,080	282,426	Ibagué
Valle del Cauca	3,897	217,159	Cali
Intendencies			
Meta		29,309	Villavicencio
Chocó		68,127	Quibdó
Commissaries:			
La Goajira		53,013	Puerto Estrella
Arauca		4,922	Arauca
Caquetá	..	24,543	Florencia
Putumayo	.	31,380	Mocoa
Vaupés	.	5,545	Calamar
Urabá	.	6,476	Acandí
Juradó	.	8,207	Pizarro
Lazarettos	.	6,793	
Colombia	1,206,200	5,072,604	Bogotá

The larger municipal populations in 1912 were: Bogotá (the capital), 121,257; Medellín, 71,004; Barranquilla, 48,907; Cartagena, 36,632; Manizales, 34,720; Sonsón, 29,346; Pasto, 27,760; Cali, 27,747; Aguadas, 26,423; Ibagué, 24,693; Palmira, 24,312; Neiva, 21,852. The language and civilization are Spanish; persons of pure Indian blood number perhaps 15 per cent of the total population, and of pure white blood 10 per cent.

Education and Religion. Education is free, but not compulsory, and is to a large extent maintained by the state. Besides the university at Bogotá, there are a national institute for working people, a school of arts and trades, and a national school of music. Secondary education is directed largely by the religious orders. There are over 4000 primary schools, with nearly 300,000 pupils. Religious toleration and free speech are guaranteed by the constitution; but the state religion is Roman Catholicism.

History. The north coasts of Colombia were visited by Ojeda and Vespucci in 1499. Three years later Columbus explored a section of the country and attempted to found the first Spanish colony on the American mainland. Between 1511 and 1517 Balboa and Pedrarias explored and settled both coasts of the Isthmus. As early as 1515 Pizarro and Gaspar de Morales had explored the Pacific coast as far south as "Biru," a term from which the present territory of Peru gets its name, although lying considerably beyond Pizarro's "Biru." Between 1536 and 1540 Ximenes de Quesada conquered the Chibchas, or Muyscas, the principal nation, and the country became a dependency of Spain. It was known as the Province of New Granada till 1718, when it was made a viceroyalty. With the other Spanish possessions, it revolted in 1810 and in 1819 became independent, joining with Venezuela (1819), under the leadership of Bolívar, and Ecuador (1822) to form the Republic of Colombia. This union was dissolved in 1829–30, and New Granada was founded as a separate republic in 1831. A new constitution was adopted in 1858, by which the separate "provinces" were changed into "states," associated under a federal government, known as "Confederación Granadina." The states were made self-governing in all internal affairs. In 1860 another revolution broke out, and for more than two years the country was devastated by civil war. Finally, in 1863, the nine states again agreed upon a constitution, organizing themselves under the name of "United States of Colombia." Another revolution, begun in 1884, was terminated in 1886 by the promulgation of a new constitution, which transformed the loose federal union into a strongly centralized state. In 1889 the insurrectionary elements reappeared, but were suppressed before they had gathered headway. A year later there was a more formidable outbreak, with severe fighting at Panama. The insurrection was due in great measure to a general feeling of discontent aroused by the corrupt conduct of the Conservative party, which was then in power In August, 1900, the Vice President, Marroquin, made himself master of the government, and carried on an energetic campaign against the Liberals. Late in 1901 Colón was taken by the Liberals, who, however, were compelled to evacuate it within a few days. Peace was concluded through the intercession of the United States in the fall of 1902. In September, 1903, the Colombian Congress rejected the Hay-Herran Treaty with the United States for the construction of the Panama Canal. This was followed by a proclamation of independence on the part of Panama on November 3. (See PANAMA.) The rôle played by the United States in the Isthmian revolution aroused bitter resentment in Colombia. President Marroquin in vain pledged himself to conclude a new treaty on terms satisfactory to the United States government. A conciliatory mission to Washington headed by Dr. Reyes was likewise without result. In 1904 Dr. Reyes became President and forthwith attempted to install himself as a dictator. Congress was dismissed, a new constituent assembly summoned, and the presidential term lengthened to 10 years. Reyes proved a success in developing Colombia's economic resources, but became unpopular by attempting to reopen negotiations with the United States, and fled, in 1909, to England. His successor, Restrepo, began his administration as a violent anti-American, but has changed his policy, and in 1913 Colombia renewed her efforts to obtain indemnity for the loss of Panama. A new treaty was negotiated with the United States authorities, which was unofficially stated to include an indemnity payment by the United States of $25,000,000 and certain privileges to Colombian vessels passing through the canal, but has not yet been sub-

mitted to the Congress of the United States and its exact provisions cannot therefore be stated. With the opening of 1914, the Colombians, despairing of their hopes, are hinting that they will build a canal of their own with British capital.

Consult: Nuñez and Jalhay, *La république de Colombie: Géographie, histoire, organisation, etc.* (Brussels, 1893); Regel, *Kolumbien* (Berlin, 1899); Scruggs, *The Colombian and Venezuelan Republics* (Boston, 1905); Wheeler, *The Agricultural Condition of Colombia* (London, 1889); Röthlisberger, *El Dorado: Reise- und Kulturbilder aus dem südamerikanischen Columbien* (Bern, 1897); Dawson, *South American Republics* (New York, 1904); Pedraza, *Republica de Colombia* (Norwood, Mass., 1909); Serret, *Voyage en Colombia* (Paris, 1912).

The standard work on the history of Colombia is Pereira, *Les Etats-Unis de Colombia* (Paris, 1883). There are numerous narratives of events of the war against Spain, written by English officers serving with the Revolutionists, of which the best are, perhaps, Hall, *Present State of Colombia* (London, 1825), and the anonymous *Recollections of a Service in Venezuela and Colombia* (ib., 1828).

COLOMBO, kō-lŭm'bō. The capital and chief seaport of Ceylon, situated on the western coast of the island, on a rocky headland, in lat. 6° 54′ N. and long. 79° 51′ E. (Map: India, C 7). The European part of the city is magnificently laid out, with broad avenues shaded by tropical trees and lined by modern buildings of fine architecture. The business part of the European city occupies the site of a fort founded by the Portuguese and rebuilt by the Dutch, and is still known as the "Fort." Its chief thoroughfare is Queen Street, in which are situated the governor's residence, the chief mercantile houses and banks, and the post office, the finest public building on the island. The residential section of the European city covers an area of about 20 square miles. The part nearest to the water is occupied by numerous clubs. Farther inland this section is crossed by beautiful roads bordered with bungalows amid luxuriant gardens. The native part of the city, or *Pettah,* is dirty and crowded, with crooked and narrow streets, always thronged with motley crowds of different types and nationalities. The houses are without doors or windows, and the passer-by can freely observe the private life of the natives. Colombo owes its commercial importance largely to its breakwaters. The southwest breakwater, one of the largest in existence, was begun in 1875 and completed in 1885; it is 4212 feet long and is built of concrete blocks weighing from 18 to 30 tons. The northeast and northwest breakwaters are rubble embankments, begun in 1894 and finished in 1906; the former is 1100 feet and the latter 2657 feet long. The three breakwaters inclose an area of about 640 acres, with a depth of from 30 to 36 feet at low water. In addition there is a graving dock 700 feet long. The shipping of the port of Colombo is very extensive, nearly the whole of the imports and exports of Ceylon passing through it. Colombo is one of the most important coaling stations for British and foreign steamers on the Australian and East Asiatic routes. It is connected by rail with Kandy, Galle, and the north of the island. It is the seat of a United States consulate.

The population of Colombo in 1901 was 158,228 (127,836 in 1891), including about 5000 Europeans, chiefly Englishmen and descendants of the Dutch, and a number of Parsis, Jews, Arabs, Tamils, descendants of Portuguese, and mixed breeds, many of whom live in houses made of mud. The 1911 census showed a population of 213,396. The natives are mostly artisans and laborers, while the Europeans are either owners of large plantations or merchants.

The early name of Colombo, Kalan-totta, the "Kalany ferry," derived from its proximity to the river, the Arabs corrupted into Kalambu. At the arrival of the Portuguese, in 1517, Kalambu had merged into Kolamba, or Columbu, which they henceforth wrote Colombo, in honor of Christopher Columbus. It was taken by the Dutch in 1656 and by the British in 1796. Consult Caye, *Golden Tips* (London, 1900).

CO'LON (Lat., from Gk. *κόλον, kolon*). The portion of the large intestine that extends from the cæcum (q.v.) to the rectum, which is the terminal portion of the intestinal canal. It is divided into the ascending, the transverse, and descending colon, and the sigmoid flexure. See ALIMENTARY SYSTEM; and, for illustration, ABDOMEN.

The whole length of the colon, from its commencement in the cæcum to its termination in the rectum, is rather more than 4 feet. It is retained in its position by the serous membrane, which envelops, partly or completely, all the intestinal viscera and is termed the peritoneum (q.v.). Its structure is essentially the same as that of the rest of the intestinal canal, which is described in the article DIGESTION, ORGANS AND PROCESS OF; but in consequence of a peculiar arrangement of the longitudinal muscular fibres, the interior of the colon is divided into sacculi, which serve to retain its contents for a longer period than if it were a uniform tube, and thus, by extracting water from them, to reduce them to a more solid consistence, such as is possessed by normal excrement. It is also devoid of villi, and it is of much greater diameter than the small intestine. In some animals, as in the horse and sheep, the shape of the fæces is completely molded in these cells.

COLÓN, kō-lōn′. A seaport city of Panama, on the Caribbean shore, about 48 miles by rail northwest of the city of Panama (Map: Central America, H 6). Colón, geographically within the Canal Zone, is situated on Manzanillo Island, between Manzanillo Bay and Limón Bay. It is the northern terminus of the Panama Railway and the Panama Canal. Practically all of the land in the city is owned by the Panama Railroad, under its original franchise from the United States of Colombia, and as the United States now owns the Panama Railroad it has thus become the owner of the land, but cannot sell it. Adjacent to Colón, on Limón Bay and practically forming a part of the city, is the American town of Cristobal, where are located the great cold-storage plant of the Isthmian Canal Commission and the shops of the Panama Railroad. The deep but exposed harbor of Colón, in Limón Bay, is naturally much inferior to that of Porto Bello, 20 miles to the east, but has been improved by a long breakwater from Toro Point erected by the Canal Commission. Steamships can come alongside the piers, and the docking equipments are modern, including cranes and other apparatus. In 1914 Colón was either the terminus or a port of call for about a dozen lines of steamships, and, on

account of the approaching completion of the canal, other lines were in project. The city has served as an entrepôt for much of the commerce between Atlantic and Pacific ports. During 1912 there entered at Colón and Cristobal 877 steamships, of 3,330,600 tons, and 32 sail, of 5200 tons. Colón consists largely of unattractive frame houses and small shops, but many of the newer houses, including the modern municipal building and the principal public school, are of concrete. Under the Treaty of 1903 the cities of Colón and Panama, while remaining Panaman territory, came under the jurisdiction of the United States in all matters relating to sanitation and quarantine. Formerly Colón was a notoriously unhealthful place, but the unsanitary conditions were removed by the Canal Commission in 1906–07; sewers and a system of water works were constructed and stringent sanitary regulations established. Unlike Panama, Colón is not an old city, having been founded in 1850 by the builders of the Panama Railroad (which was completed in 1855). For a time it was called "Aspinwall," in honor of William H. Aspinwall, one of the builders of the railroad, but subsequently the name was changed by statute to "Colón," in honor of Christopher Columbus, who sailed into Limón Bay in 1502. A fine statue of Columbus, the gift of Empress Eugénie in 1870, stands near the mouth of the old (French) canal. The town has suffered frequently from fires, notably during the revolution of 1885. When the Canal Commission undertook its work, the population of Colón was probably not much over 3000, consisting largely of Jamaica negroes and of natives of mixed Spanish, Indian, and negro blood. The census of 1911 returned a population of 17,748; estimated by Isthmian Business Directory at 20,000 in 1913. According to the Canal Zone census of 1912, Cristobal had 3584 inhabitants.

COLON (Sp., Columbus). A town in the Province of Matanzas, Cuba, about 52 miles southeast of Matanzas, connected by rail with Havana, Matanzas, Cardenas, and other important cities (Map: Cuba, E 4). It is the centre of extensive sugar refineries. Pop., 1899, 7175; 1907, 7124.

COLON BACIL'LUS, or BACILLUS COLI COMMUNIS. A microörganism discovered by Escherich in 1885, and since demonstrated to be a normal inhabitant of the intestinal tract in man and some of the domestic animals. It is a short bacillus with rounded ends, is somewhat motile, has a few flagellæ, and does not form spores. The main interest which attaches to this organism at present is due to its close resemblance to the typhoid bacillus, with which it is morphologically identical, but from which it may be distinguished by its biological peculiarities. Some investigations made within the last few years tend to show that this bacillus, while of normal occurrence in the healthy intestine, may under certain conditions migrate to other organs of the body and there be associated with pathological processes.

COLONEL, kẽr'nel (originally *coronel, coronell,* from Sp. *coronel,* colonel, It. *colonello,* Fr. *colonel, colonnel,* from Sp. *colonello,* column at the head of a regiment, dim. of *colonna,* column, from Lat. *columna,* column; the first *l* is changed to *r* either through dissimilation, or through popular confusion with Lat. *corona,* crown). A military title, ranking in the United States army between lieutenant colonel and brigadier general. The command appropriate to the grade is a regiment. In the United States service the army grade of colonel corresponds to that of captain in the navy. In addition to the colonels commanding regiments of the three arms, infantry, cavalry, and artillery, there are also *staff* colonels, without command, assigned to the several staff corps and departments. In the English service a colonel actively commands artillery and engineers. The infantry battalion and cavalry regiment are actually commanded by the lieutenant colonels of the regiments, the office of colonel being an honorary sinecure, carrying certain emoluments, and often bestowed upon royal and other distinguished personages. The same custom prevails in some of the continental armies. In England the custom prior to 1888 was to give the appointment of colonel to retired general officers as a reward for long service. Since that date no officer can obtain the rank except as a brevet, and then only for distinguished service or on such appointments as the colonel commanding a territorial district depôt. See RANK AND COMMAND.

COLONEL CHABERT, LE, le kô'lô'nĕl' shà'bâr'. A story by Balzac (1832), the tale of a soldier of the Grand Army, who comes back from the wars to find his wife married to another.

COLONEL JACK, HISTORY OF. A novel by Defoe (1722). Beginning life as a thief, the hero goes to Virginia, and finally becomes a respectable planter and slave owner.

COLONIA. See COLONY.

COLONIA, kô-lō'nê-à (Sp., colony). The capital of the department of the same name, Uruguay, on the Río de la Plata, nearly opposite Buenos Aires. It has a good harbor, docks, and a dry dock, and is a place of some commerce, particularly with Buenos Aires (Map: Uruguay, F 10). Pop., about 1500. Colonia was founded by the Portuguese about 1680 under the name "Colonia del Sacramento." Owing to its nearness to Buenos Aires, it gave rise to many conflicts for its possession between the Spanish and the Portuguese. In the course of one of these struggles it was almost totally destroyed in 1777. In 1806 the English, in a desperate attempt to secure the La Plata region, captured Colonia and held it for some months.

COLO'NIA AG'RIPPI'NA. The Roman name of Cologne (q.v.).

COLO'NIAL ARCHITECTURE. See ARCHITECTURE, *Colonial Architecture.*

COLONIAL CORPS. A term formerly applied specifically to colonial troops of the British Empire, but now in general use as referring to similar troops of other nations. They are usually raised for service in the colony to which they belong and not for foreign operations. An exception is the use made of the West Indian regiments of Great Britain, in the frequent punitive expeditions on the west coast of Africa. Colonial corps are officered by the regular army officers of the nation to which the colony is subject. English colonial corps are the King's African Rifles, the West African regiments (negroes), and the Hongkong Regiment. The Philippine Scouts, the Philippine Constabulary, and the Porto Rico Regiment of Infantry serve a similar purpose in the United States army. The most important attempt in recent years to build up a body of colonial troops is that made by the French Republic, which has 16 regiments of colonial infantry, three regiments of colonial artillery, and a corps of colonial cavalry. They

include the Senegal, Tonkin, and Annamite tirailleurs; the Senegal spahis; the Nalagasy tirailleurs, and the native battalions of Gaboon. Twelve of these regiments are stationed in France.

COLONIAL DAMES OF AMERICA, NATIONAL SOCIETY OF THE. A women's patriotic society, organized in Wilmington, Del., in 1892. It is composed of State societies, of which there is one in each of the 13 original States and in the District of Columbia, together with associated societies in the non-Colonial States of California, Illinois, Michigan, Minnesota, Iowa, Ohio, Colorado, Maine, Missouri, Wisconsin, Tennessee, Louisiana, Kansas, Indiana, Alabama, Texas, Arkansas, West Virginia, Mississippi, Oregon, and Vermont. The objects of the society are the collection and preservation of manuscripts and relics of Colonial days, the restoration of historic buildings, the more general diffusion of information concerning the Colonies, and the stimulation of a spirit of true patriotism. Membership in the society is limited to women who are especially invited, and who are descended from some ancestor of worthy life who came to reside in an American colony prior to 1750. The national committee on historic research in the several States has erected memorials, pursued investigations, and issued publications such as *The Letters of William Pitt, Lord Chatham.* The membership in 1914 was over 9000.

COLONIAL DAMES OF AMERICA, SOCIETY OF. The first women's patriotic society in America, organized in New York City in 1890, incorporated in 1891, and having for its purposes the collection of manuscripts, traditions, relics, etc., of Colonial and Revolutionary times, and the commemoration of the success of the Revolution. Membership in the society is restricted to women who are directly descended from some ancestor of distinction who came to reside in an American colony before 1776. In 1914 it had chapters in New York, Baltimore, Philadelphia, Washington, Paris, San Francisco, and Shreveport, La. Consult Browning, *Some Colonial Dames of Royal Descent* (Ardmore, Pa., 1900).

COLONIAL EDUCATION. See EDUCATION, COLONIAL.

COLONIAL WARS, SOCIETY OF. A patriotic society, organized in New York City in 1892. It consists of a general society made up of general officers and of delegates from the various State societies as follows, in the order of their institution: New York, Pennsylvania, Maryland, Massachusetts, Connecticut, District of Columbia, New Jersey, Virginia, New Hampshire, Vermont, Illinois, Missouri, Ohio, Nebraska, Minnesota, Kentucky, California, Colorado, Iowa, Georgia, Michigan, Wisconsin, Delaware, Rhode Island, Washington, Maine, and Indiana. The various State societies have, for their general object, to perpetuate the memory of Colonial events and of the men who, in military, naval, and civil positions of high trust and responsibility, by their acts of counsel assisted in the establishment, defense, and preservation of the American Colonies. With this end in view they seek to collect and preserve records relating to the Colonial period of American history and to inspire in their members the fraternal and patriotic spirit of those who made American freedom and unity possible. They admit to membership male descendants of those who assisted in the establishment, defense, and preservation of the American Colonies. The publications of the general society include general registers and historical papers and registers by the various local societies. The general society has erected a monument at Louisburg, on Cape Breton Island, and memorial tablets have been placed by the New York society on the sites of Fort Oswego and Fort Ticonderoga, and an imposing monument has been erected at Lake George. The membership in 1914 was about 4500. The New York society has placed tablets at Fort Amherst at Crown Point and also at the corner of Wall and William streets, New York, where once stood a bastion of the wall raised by the colonists for protection.

COLONIES, THE THIRTEEN AMERICAN. See UNITED STATES, *History.*

COL'ONIES OF PLANTS OR ANIMALS. See CŒNOBIA; POLYP.

COL'ONIZA'TION SOCIETY, THE NATIONAL, OF AMERICA. An association organized in 1816, by Robert Finley (q.v.), "to promote a plan for colonizing (with their consent) the free people of color residing in our country, in Africa, or such other place as Congress may deem most expedient." Branches were established throughout the country, and an active propaganda was conducted in almost every State, the official agents of the society speaking frequently in public and soliciting the coöperation of the various State legislatures. The first colonists were sent out to Sherbro Island, Africa, in 1820; and two years later Liberia was founded. Bushrod Washington, Charles Carroll, James Madison, Henry Clay, and J. H. B. Latrobe served successively as presidents of the society, while such men as Bishop Hopkins, Rufus King, Dr. Channing, Benjamin Lundy, Gerrit Smith, and James G. Birney were at one time zealous members. After about 1831, however, when the movement for the abolition of slavery may be said to have first attracted general attention, the inadequacy and impracticability of the society's aims became increasingly apparent, and many of its more influential members withdrew their support. Its persistent refusal to interfere in any way with slavery, moreover, and its apparent encouragement of the racial prejudices of the whites against the blacks alienated many others who, though strongly opposing the radicalism of Garrison, believed in a policy of gradual abolition and had faith in the negro's capacity for improvement. The general idea of colonization seems to have originated with the Rev. Samuel Hopkins, of Newport, in 1770. Consult Wilson, *History of the Rise and Fall of the Slave Power in America,* vol. i (Boston, 1875), and Alexander, *A History of Colonization on the Western Coast of Africa* (Philadelphia, 1846).

The shortcomings of the society's aims, judged from an abolitionist standpoint, are admirably set forth in Garrison, *Thoughts on Colonization* (Boston, 1832); Birney, *Letter on Colonization* (New York, 1834); and Jay, *An Inquiry into the Character and Tendency of the American Colonization and Antislavery Societies* (ib., 1834).

COLON'NA. A celebrated Italian family, prominent in the history of Rome from the twelfth century to the sixteenth. They were hereditary enemies of the Orsini (q.v.), and their numerous strongholds around Rome made them at all times formidable enemies to the papacy, and on occasion its masters. To Rome the Colonnas gave a pope, 30 cardinals, and a

great number of senators and military commanders. The name of the family was probably derived from Colonna, a small settlement near the fortress of Palestrina; and Pietro of the Column, Lord of Palestrina in 1100, is commonly regarded as the ancestor of all the princely branches of Colonna, comprising at present the houses of Colonna-Paliano, Colonna di Sciarra, and Colonna-Stigliano.—EGIDIO COLONNA was born at Rome about 1247. He entered the Augustine Order and pursued the study of theology at Paris, where he was preceptor to Philip the Fair. He became general of the order in 1292 and in 1296 was made Archbishop of Bourges. He was the author of a political treatise entitled *De Regimine Principum*, dedicated to Philip the Fair and noteworthy for its systematic treatment of the art of war. He died in Avignon in 1316 and was buried at Paris. Of his works, which are marked by a good deal of dull erudition, part have remained unpublished.—LANDOLFO COLONNA was a canon of Chartres in the first half of the fourteenth century. There are attributed to him a manual of history from the creation to the pontificate of John XXII, a history of the popes, and a Latin work, *De Statu et Mutatione Romani Imperii*.—SCIARRA COLONNA was a bitter enemy of Pope Boniface VIII. War broke out between the two in 1297 over the possession of Palestrina. Sciarra was excommunicated and deprived of all his honors, and after the destruction of Palestrina by the papal forces in 1298 was compelled to flee to France. He gained the favor of Philip the Fair and, returning in the company of the French Chancellor Nogaret in 1303, resumed hostilities with the Pope, and on September 7 took the aged pontiff prisoner at Anagni. (See BONIFACE VIII.) He became Senator of Rome in 1313. He embraced the cause of Louis the Bavarian, whom he crowned Emperor in St. Peter's in 1328, but on the latter's departure was forced to flee from Rome. He died in exile in 1329.—STEFANO COLONNA, brother of Sciarra, was made Governor of Bologna in 1289. Involved in the struggle against Boniface VIII, he fled to France at about the same time as his brother. He returned after the death of Boniface and assumed a leading part in Roman politics, acting in opposition to Rienzi (q.v.), who drove him from the city in 1347. Stefano was a friend of Petrarch, who speaks of him in the *Trionfo della fama* and in his sonnets.—GIOVANNI COLONNA led an insurrection against Boniface IX in 1404 and after the election of Innocent VII joined forces with Ladislaus of Naples, driving Pope John XXIII from the city in 1413. He was killed in 1417.—OTTONE, or ODDONE, COLONNA was Pope from 1417 to 1431. (See MARTIN V.)—FABRIZIO COLONNA joined Charles VIII of France in the invasion of Naples in 1494, but soon went over to the enemy and was made Grand Constable of Naples. He defended Capua against the forces of Louis XII and took part in the battle of the Garigliano (1503). In the Holy League against France he was commander of the papal forces and, with his Spanish allies, was defeated by Gaston de Foix at Ravenna in 1512. He died in 1520. His military talents are lauded by Machiavelli in his *Arte della guerra* and by Ariosto in the *Orlando*. His daughter was Vittoria Colonna. (See COLONNA, VITTORIA.)—POMPEO COLONNA, one of the ablest generals of his time, fought under Gonsalvo de Cordova against the French. In 1513 he defeated the Venetian General Alviano in the neighborhood of Vicenza. He took Milan from the French in 1521, and in the following year gained the victory of La Bicocca over Marshal Lautrec and captured Genoa. In 1523 he held Milan against the French, but was struck down by disease and died of fast living towards the end of the year.—Another POMPEO fought in the wars of the great Cordova, distinguishing himself at Cerignola (1502) and the Garigliano (1503). He entered the Church after the death of Alexander VI and in 1517 was made Cardinal. He took an especially active part in political affairs during the pontificate of Clement VII, whose enemy he was. He was made Viceroy of Naples in 1530 and died suddenly June 23, 1532.—ASCANIO COLONNA, the son of Fabrizio, shared the family hatred for Clement VII. With the support of the Spaniards he stormed Rome, Sept. 20, 1526, and sacked St. Peter's and the Vatican. Entering the service of Charles V he was made Grand Constable of Naples, but towards the end of his life fell into disgrace. He died in prison in 1557.—MARC ANTONIO COLONNA was exiled from Rome by Pius IV and entered the military service of Spain, whose forces he successfully commanded against the Papal States in 1556. He was thereupon recalled and commanded the papal galleys in the battle of Lepanto, Oct. 7, 1571. He was made Viceroy of Sicily and died in 1584.—FABIO COLONNA, born at Naples in 1567, was a botanist of some eminence. He was the author of *Storia naturale del Messico*, a work based on that of Hernandez. He died in 1651. Consult: Cirocco, *Vite de alcuni cardinali de casa Colonna* (Foligno, 1635); Agostino, *Storia de casa Colonna* (ib., 1608); Gregorovius, *The History of the City of Rome in the Middle Ages* (London, 1895–1900); Mattioli, *Studio critico sopra Egidio Romano Colonna* (Roma, 1896).

COLONNA, ALEXANDRE, F. J. See WALEWSKI.

COLONNA, CAPE. See CAPE COLONNA.

COLONNA, GIOVANNI PAOLO (1637–95). An eminent Italian composer. He was a pupil, in Rome, of Carissimi, Benevoli, and Abbatini, became chapelmaster of San Petronio in Bologna, and was repeatedly president of the Accademia Filarmonica there. One of the most distinguished Church composers of the seventeenth century, he is remembered as the head of the Bolognese school, which produced many famous musicians. His best works for the Church, including masses, psalms, litanies, motets, etc., for from 3 to 8 voices, were published in 12 collections (1681–94). He also produced 11 oratorios and 3 operas. Many other works are preserved in manuscript.

COLONNA, VITTORIA (1492–1547). An Italian poet. She was the daughter of Fabrizio Colonna, the Grand Constable of Naples, and was born in Castello di Marino near Rome. Her youth was passed among the greatest literary spirits of Italy, and from them she gathered a love of learning and in that atmosphere composed her first poems. At 17 she married Francesco Ferrante d'Avalos, Marquis of Pescara, to whom she had been betrothed since childhood. This marriage had no issue, to the bitter disappointment of them both, and for Vittoria Colonna the sorrow was deepened by the gradual estrangement of her husband. Living apart from him at Naples and Ischia, she wrote her earlier poems in an exquisite vein of tender melancholy

at his absence, clinging later, as Ferrante rose to fame in the service of Charles V, to his glory as her principal consolation. After his death in 1525 with the laurels of Pavia on his brow, her sonnets assume a high flight of religious exaltation, expressed as were the earlier ones in Petrarchistic form. Of her many distinguished friendships that with Michelangelo is the most celebrated. Their "Platonic" relationship was at its height about this time, and left the sonnets of Michelangelo as its enduring monument. Vittoria Colonna at Naples was in close touch with the group of reformers about Valdés, and she undoubtedly shared the religious views of Reginald Pole, Contarini, and Bernardino Ochino. Her personality, one of the most beautiful of her age, is developed in the biography of Reumont (Turin, 1893), and in her *Carteggio*, ed. by Ferrero-Müller-Tordi (Turin, 1889 and 1892). Of her poems, translated by Roscoe (London, 1868) and Lawley (London, 1889), the best editions are by Mazzone (Marsala, 1897, and Giarre, 1900), and by Tordi (Pistoia, 1900). Consult also Jerrold, *Vittoria Colonna* (New York, 1906).

COLONNADE'. A row of columns supporting an entablature. When a row of columns supports arches, it is properly termed "a columnar arcade." A colonnade may be either internal or external to a building, or may, like the great curved quadruple colonnades of the plaza in front of St. Peter's at Rome, be a quite independent structure. The Greeks were the first to develop the artistic use of colonnades as exterior features; they surrounded the courts of palæstræ and market squares with them and built columnar porticoes called *stoæ* to connect important buildings or afford sheltered places for meeting and conversation. The Romans erected colonnades of colossal dimensions and great splendor, not only in Italy, but at Palmyra, Baalbec, Gerasa in north Africa, and elsewhere. A colonnade surrounding a temple is called a *peristyle;* the temple is called in that case *peripteral,* or *dipteral* if the peristyle be double. The names "tetrastyle," "hexastyle," "octastyle," "enneastyle," "decastyle," and "dodecastyle" specify colonnades of 4, 6, 8, 9, 10, and 12 columns respectively. The spacing of columns is treated of under ORDERS OF ARCHITECTURE (q.v.). See COLUMN.

COLON'NA PALACE. The palace of the Colonna family at Rome. It contains an important gallery of pictures and has a beautiful garden.

COLONNE, kô'lŏn', JULES JUDE, called EDOUARD (1838–1910). A French orchestra leader and violinist, born at Bordeaux. He was a pupil, while at the Conservatory in Paris, of Sauzay, Elwart, and Ambroise Thomas. After taking the prize in harmony and the first *prix de violon* at the Conservatory, M. Colonne became first violin at the opera house, but gave that up in order to establish a series of Sunday concerts at the Odéon, known later as the Association Artistique. He gave Paris its first hearing of works by Tschaikowsky, Grieg, Wagner, and Raff, and did much for the cause of Berlioz. He was in great demand as a "guest conductor." In 1904 he visited the United States.

COLONNE DE LA GRANDE ARMÉE, *de* lȧ grȧN dȧr'mȧ'. A Doric column near Boulogne, France, commemorating Napoleon's project of invading England and founding a republic there. It is 172 feet in height and surmounted by a bronze statue of Napoleon. It was begun in 1804, but was not finished until 1841.

COL'ONNETTE' (Fr., dim. of *colonne,* column). In architecture, a small column used more for decorative than constructive purposes. It is seldom found in ancient monuments, but is a characteristic feature of the Middle Ages. The façades and apses of Tuscan churches (Pisa, Lucca), and the interior galleries of French Gothic cathedrals, show how rich an effect can be obtained by long lines of such colonettes, connected by arches and either free standing or placed against a wall. Colonnettes also occur in early Renaissance architecture, especially in minor works (pulpits, tombs, etc.) and in the Francis I style in France.

COL'ONSAY. One of the inner Hebrides, or Western Isles of Scotland, off the southwest mainland of Argyllshire, in the Firth of Lorne, between the isles of Islay and Mull, with the small isle of Oronsay, of the southern end, separated by a narrow sound, dry at low water (Map: Scotland, B 3). Colonsay and Oronsay are together 12 miles long from northeast to southwest, and 1 to 3 miles broad. The surface is irregular and composed of mica slate. Half the surface is cultivated. Next to Iona, Colonsay contains the most extensive remains of religious edifices in the Western Isles. On Oronsay stands a large stone cross and the ruins of a monastery founded in the fourteenth century. Potatoes and barley are the chief products, cattle also being raised. Pop., 1901, 301; 1911, 267.

COL'ONY (Lat. *colonia,* from *colonus,* a husbandman, colonist, from *colere,* to till). In its proper sense "colony" denotes a body of immigrants living in a foreign land under the laws and protection of the mother country; but the term has been used loosely to describe all classes of distant territories dependent in any form on a ruling power, from mere military posts like Gibraltar or Port Arthur to practically autonomous states like Canada or Australia. The Greeks were preëminently a colonizing people. They established communities in Asia Minor, in Thrace and the Crimea, on the coast of Africa, in Italy and Sicily, and in Gaul. Marseilles was a Greek town, founded by the inhabitants of Phocæa about six centuries before the Christian era. The first great colonization movement of the Greeks followed as a consequence of the so-called Dorian migration, when the conquered peoples were driven from their lands and compelled to find new homes. The second movement, which took place in the period between the eighth and the sixth centuries B.C., was due to political disturbances at home, the necessity of drawing off the surplus of population, and military and commercial interests. When it had been determined to send out a colony, the oracle was consulted, and a leader, called *oikist,* οἰκιστής, was duly appointed; fire was taken from the sacred fire that burned in the Prytaneum, and the new society, though politically independent, patterned itself after the mother city. The relation between the two communities was one of mutual affection only; but, if the new colony undertook itself to found a colony, it went, through custom, for its *oikist* to the mother city. Differing from the colony as thus described was the *cleruchy* (κληρουκία, allotment or apportion-

ment, from κλῆρος, lot, and ἔχειν, have), the members of which remained in close connection with the mother city and did not form an independent community. The Athenian cleruchies, the only ones of which we have any detailed knowledge, possessed a certain measure of autonomy, but only in internal affairs.

It was one of the triumphs of the organizing genius of the Romans to develop the colony to a more perfect form. It was a principle of Roman policy that not only every conquered territory, but every district where Roman citizens settled, should be an integral part of the Empire. The *colonia* was one of the municipal institutions of the Empire, having its own governing corporation dependent on Rome. There were various grades of colonies—some where there was the high privilege of Roman citizenship, and others where the citizenship was of a humbler grade. Corresponding with the consuls in Rome, there were municipal officers in the colonies (*duumviri, quatuorviri*), in whom were preserved, after the Empire was formed, the old republican institutions. The Romans appointed men of very high rank to the government of their provinces or colonies—men who had held such offices as the consulship or prætorship at home. It was a feature of the Roman system to limit their period of government, lest they should become independent of the Empire and establish separate states.

After the fall of Rome centuries passed before colonization recommenced; for the various tribes who broke into the Empire were not connected with any parent state, and the Normans who spread themselves over Europe at a later period were utterly unconnected, in the countries where they settled, with the government of the northern states whence they migrated. When Venice and Genoa were at the height of their power, they sought to advance their commercial interests by the establishment of colonies in the islands of the Mediterranean and on the shores of the Hellespont and the Black Sea. At the close of the Middle Ages the Portuguese and Spaniards became the great colonizing nations of Europe. Portugal was first in the field, establishing settlements along the western coast of Africa in the fifteenth century. After the rounding of the Cape of Good Hope by Bartholomeu Dias in 1488, which was followed 10 years later by the voyage of Vasco da Gama, she extended her settlements along the eastern coast and into India, finally penetrating to the islands of the Pacific. The Emperor Charles V, who ruled Spain when at the height of her power, aimed not only at the restoration of the Roman Empire in Europe, but at the creation of a new empire in America. Neither Spain nor Portugal followed the policy of developing the agricultural resources of the regions which they occupied, but merely used the colonies as a basis of profitable trade with the home country and as an asylum for high-salaried officials. Portugal established mere trading factories. The Spanish colonies were chiefly concerned with mining. They were governed by an official hierarchy, under the general direction of an executive department in Spain. The other governments of Europe—Great Britain, France, Holland, and the minor states—subsequently colonized in America, the East Indies, and Africa.

The earlier British colonies arose in the reverse order to those of Spain—the colonists went first, the dignitaries followed. This was especially true of the New England Colonies. Before 1630 the British race had gained a firm foothold in America. The settlers were organized as privileged companies with royal letters patent, which in practice made them virtually independent of the government at home; and as they were, for the most part, dissenters seeking a place of refuge from what they considered the grievances of the Established church and the government, they took care not to convey the grievance with them. The Northern colonists, indeed, acted as if they were a sort of private corporation. The policy of Great Britain towards her American Colonies was the result of the accepted economic philosophy of the times (see POLITICAL ECONOMY), according to which it was thought that the trade with colonies must be strictly confined to the home country. The idea was that the colonies should supply raw materials to the mother country, and in return should purchase from the latter its manufactured products. Shipping was to be in the hands of the home country. This policy was no more characteristic of England than of other European states, and the reason why it encountered such vigorous opposition in the Anglo-American Colonies was that the latter were settled by men who deliberately planned to establish homes in the New World, whereas those who made up the colonies of Spain, Portugal, or France were seeking wealth and prestige with which to reestablish their position in Europe. But no matter from what country these earlier colonists came, they did accomplish one fundamental thing: they made possible the accumulation of a sufficient supply of capital to encourage and to stimulate the invention of new machinery which, beginning in the eighteenth century, completely revolutionized society in the nineteenth. See INDUSTRIAL REVOLUTION.

During the eighteenth century Great Britain rose to a foremost position among colonial powers, and in the nineteenth century she firmly established her primacy. Rich compensation for the loss of the Thirteen Colonies—a loss which for a time seemed to threaten the dissolution of her empire—was found in the vast realm built up in India and in the flourishing colonies of Canada and Australia. In Africa, which became the principal scene of colonial activity for the European Powers in the last quarter of the nineteenth century, Great Britain holds possession of Cape Colony and the former Boer republics, and of immense tracts of territory in Central and eastern Africa. Coupled with her predominance in Egypt, this would seem to assure to England a splendid colonial development in the Dark Continent. Spain's colonial empire attained its fullest development in the seventeenth century, declined in the eighteenth, and disappeared in the nineteenth. The Treaty of Paris, in 1763, deprived France of her possessions in America and put a quietus on French colonization, Algeria excepted, for more than 100 years, until the statesmen of the Third Republic initiated a new policy of expansion in Africa and the Far East. The Dutch establishments in the East were founded in great part upon the ruins of the colonial power of Portugal. At the time of the French Revolutionary wars Holland was shorn of some of her possessions (Ceylon, Cape Colony), which went to increase the colonial domain of Britain. The annals of Dutch dominion in the East Indies have until recent times been the history of a

nation seeking to enrich itself at the expense of downtrodden peoples. With the loss of Brazil in 1822, the importance of Portugal as a world power departed. By its victory over Spain in 1898 the United States took its place among the colonial powers of the world; and through the solution of the problems presented by the necessity of reconciling the element of autocracy inherent in the administration of foreign possessions with the republican theory of American institutions, the term "colony," already loose in meaning, has attained a still broader application. See the articles on the various countries for detailed accounts of their colonies.

The problems of modern colonization are manifold. Among them are the meaning and significance of imperialism; the subjugation of alien races; the fight to capture world markets; the possibility of the tropics as a permanent home for settlers from the more temperate zones, and a dozen others. The literature upon colonization is enormous and is ever widening in scope and scientific value, from Adam Smith's *Wealth of Nations* (1776) down to the publisher's latest announcement. Consult: Brougham, *An Inquiry into the Colonial Policy of the European Powers* (Edinburgh, 1803); Wakefield, *A View of the Art of Colonization* (1849); Heeren, *A Manual of the History of the Political System of Europe* (London, 1857); Cairnes, *Colonization and Colonial Government* (ib., 1873); Roscher, *Kolonien, Kolonialpolitik und Auswanderung* (Leipzig, 1885); Norman, *The Peoples and Politics of the Far East* (London, 1895); Worsfold, *South Africa: A Study in Colonial Administration and Development* (ib., 1895); Dubois, *Systèmes coloniaux et peuples colonisateurs* (Paris, 1895); Englehardt, *Les protectorats anciens et modernes* (ib., 1896); Kidd, *The Control of the Tropics* (London, 1898); Reinsch, *World Politics* (New York, 1900), and *Colonial Government* (ib., 1902); Giddings, *Democracy and Empire* (ib., 1900); Dilke, *The British Empire* (London, 1899); Egerton, *A Short History of British Colonial Policy* (ib., 1897); Reinsch, *Colonial Administration* (New York, 1905); Zimmerman, *Colonialpolitik* (Leipzig, 1905); Schaefer, *Kolonialgeschicte* (ib., 1910); Adam, *L'Impérialisme et la morale des peuples* (Paris, 1908); Alston, *The White Man's Work in Asia and Africa* (London, 1907); Leroy-Beaulieu, *De la colonisation chez les peuples modernes* (Paris, 1908); Flammarion, *Domination et colonisation* (ib., 1910).

COL'OPHON (Lat., from Gk. Κολοφών, *Kolophōn*). An ancient Greek city of Ionia in Asia Minor. It was situated on the river Hales, about 15 miles north of Ephesus, was the native city of Mimnermus and claimed to be the birthplace of Homer. The expression, "to put the Colophon," meaning "to give the finishing stroke," is explaned by Strabo as arising from the belief that the cavalry of Colophon was so excellent that it always decided the contest. Hence comes the term *Colophon*, used of a device at the end of a book, or a note, especially one giving the name of the printer, date of publication, etc. The name of the town may, however, come rather from Gk. κολοφών, *kolophon*, 'summit'; in the expression "to put the Colophon," the word κολοφών may easily have passed from the sense of "summit" to that of "end." Several other Greek words meaning "peak," or "tip," are used in phrases of similar meaning. Cf. the history of the word *acme*.

COL'OQUIN'TIDA. See COLOCYNTH.

COL'OR (Lat., connected with Lat. *celare*, Gk. καλύπτειν, *kalyptein*, Ger. *hehlen*, to hide, Ir. *celim*, I conceal, Skt. *śarana*, refuge). The color of an object in nature depends upon several conditions: the character of the light which illuminates it, the phenomena which take place in the body itself, the individual peculiarities of the eye which views the body. It has been shown by Sir Isaac Newton that ordinary white light may be regarded as a mixture of many colors; i.e., it may be analyzed into parts, each part producing a different color sensation. In scientific language, the sensation white, as perceived by looking at any ordinary "white" object, is due to the incidence upon the eye of trains of ether waves of different wave numbers, varying continuously between certain limits; while, if a train of waves of a definite wave number enters the eye, the sensation of color (if any) will be of a definite hue. Thus we speak of yellow light, of red light, etc., meaning those ether waves which produce these sensations of yellow or red in a normal eye. When the ether waves fall upon an object, some of the energy goes into reflected waves *at the surface*, the rest goes into the entering waves; there will in general be absorption in the interior; but if the body is transparent there will be transmitted waves, and also, in general, waves reflected and scattered by little particles in the interior of the body. The color of a green leaf is due to the fact that when viewed in ordinary daylight, out of all the waves which *enter* the leaf, only those which combine to produce the sensation green are transmitted, the others being absorbed by the coloring matter of the leaf; thus, those waves which are scattered by the minute interior parts traverse a layer of this coloring matter, and only green light emerges from all sides. The light which in this case is reflected at the surface is simply diffuse white light. An object whose color is due, as here, to what is called "body absorption," appears of the same color when viewed by reflected light or by transmitted; i.e., if we look *through* it at the source of light, or look at it from the same side as is the source. The colors of almost all natural objects are due to this body absorption.

The colors of metals, however, and some aniline dyes, are due to what is called "surface absorption." When white light is incident upon a piece of gold, yellow light is reflected *by the surface*, thus giving the yellow color. If, however, the gold is hammered out exceedingly thin, it will be found to transmit greenish-blue light, so that in the case of surface color the colors by reflection and transmission are different.

The energy of the waves which are absorbed in bodies generally goes to producing heat effects; but in some cases it is spent in producing other ether waves, thus giving rise to other colors. These bodies are called "fluorescent." (See FLUORESCENCE.) In these cases, then, the color as seen by transmission and by looking at the bodies sidewise will be different.

The color of the blue sky, of fine smoke, and of water in many lakes is due to the scattering of light by extremely small particles—generally minute solid particles; for the short waves—i.e., blue light—are reflected by minute particles, while the other waves simply pass

around them. In all these cases it is evident that if the incident light is altered, so will be the color perceived. A green leaf in a yellow light would appear black. For an excellent treatise on color, consult Rood, *Modern Chromatics* (New York, 1879); also, Bradley, *Elementary Color* (Springfield, Mass., 1895); Jorgensen, *The Mastery of Color*, 2 vols., with 22 colored plates, showing about 1000 colors (Milwaukee, Wis., 1906); and Ridgway, *Color Standards and Color Nomenclature*, with 53 colored plates and 1115 named colors (Washington, D. C., 1912). See LIGHT; VISUAL SENSATION.

COLOR. In art, either the pigment employed to produce a certain effect to the eye, or the effect thus produced, i.e., the tint of a picture. In the former sense it is treated of in this work under PIGMENTS and the names of the principal colors. In the latter sense it may be defined as the general effect of all hues entering into the composition of the picture. It is the most important technical requisite of painting, and quite essential to a production of the first rank. The sensation of color is produced by waves of light setting into vibration fibres of the optic nerve, and the length of these light waves is the cause of the different hues. For example, when the light wave is $\frac{1}{39000}$ of an inch long, red is the color produced, and as the waves decrease in force, we see yellow, green, blue, and so on through the spectrum. According to the theory of Chevreul, now generally accepted, white light is the union of all colors, and its decomposition by an object reveals the color separated from the rest. Thus, a rose absorbs all colors but red, which it reflects; while a white substance, rejecting all colors, is therefore colorless. Correctly speaking, there are but six colors—three primary (red, blue, and yellow), and three secondary (orange, violet, and green). Orange is composed of purple and yellow, violet of red and blue, green of yellow and blue. All other colors are compounds of these.

Complementary Colors are those which, combined with another color or colors, make up the three primary colors constituting white light. If the given color be primitive, its complement is composed of the other two primitive colors. For example, the complementary color of blue is orange, i.e., red and yellow. If the given color be a secondary, its complementary is the remaining primitive color—as, e.g., the complementary color of green (blue and yellow) is red. In painting brilliancy of coloring may be obtained by placing complementary colors side by side, because each lends to the other a favorable halo, while the juxtaposition of non-complementary colors has the opposite effect of dullness. This method of heightening and softening colors was used with great effect by Delacroix and is to-day much practiced by French and Spanish painters.

It is also usual in the studios to divide colors into warm tones and cool, according as they approach or depart from the colors of sunlight. Reds, oranges, and yellows are regarded as warm; blues, greens, and violets as cool. In painting it has long been customary to relieve warm colors by placing them near cool. This is especially marked in Correggio's pictures, which have a central point of warm color with the surroundings cool. The Florentines reversed this process, while the Venetians intermixed warm and cool tones, and Rubens placed them side by side.

Contrast of Color is either simple or compound. Each of the primary colors forms a contrast to the other two. Thus, blue forms a simple contrast to red and yellow. But if red and yellow were mixed together, the complementary color to blue would be produced, viz., orange, which is the most powerful contrast to blue. Contrast was the earliest and simplest way of obtaining color effects. It was almost universal among the Italians of the Renaissance, as witness the reds and blues in the garments of the Madonna and the saints. In modern times it has been much used, but not with the same success, by the Pre-Raphaelites in England and the followers of Ingrès in France.

Harmony of Color is usually attained by giving to the painting a prevailing color or tone, to which all the others are subordinated. It is based rather upon accord than upon contrast. For in nature there are few sudden contrasts of color, but rather gradual transitions and delicate gradations. Harmony endeavors to preserve the same tones in a painting as exist in nature. It discriminates between the same color seen in sunlight and in shadow, near or at a distance; or, in other words, between the values of colors. No matter how different the colors of the pictures, they must all accord with the dominant color tone.

The mastery of color is the most difficult achievement of painting, and it has been truly said that the colorist, like the poet, is born and not made. Concerning the Greeks, it is impossible to make statements with surety, since all their great paintings have perished. The Oriental peoples have always excelled in color, especially in their textile fabrics and ceramics. In painting, also, the Chinese and Japanese have attained remarkable and subtle harmonies. All the great schools of painting have attained excellence in color. Among the Italians the painters of Venice excelled, and in the works of Giorgione, Titian, and others attained an unsurpassed excellence. Of the great schools of the seventeenth century, which likewise excelled in color, the Flemish (Rubens) excelled in bright but harmonious effects, the Dutch (Rembrandt) in more subdued color schemes, with subtle treatment of light and shade (q.v.), and the Spanish (Velasquez), in values (q.v.) of colors. The chief excellence of the old English masters consisted in their color, and the French painters of the rococo (Watteau, Fragonard) were excellent colorists. The beginning of the modern development of painting consisted in the romantic reaction against classic line in favor of color. (See PAINTING, *History.*) The Impressionists have discovered many new tints and raised the entire scale of color. Among the many colorists of note belonging to the American school are Whistler, Abbey, and Childe Hassam.

Bibliography. The technical qualities of painting are briefly treated in a number of manuals on the appreciation of art, enumerated under the bibliography of ART, among which see especially Van Dyck, *Art for Art's Sake* (New York, 1901). Other good manuals are Blanc, *Grammaire des arts du dessin* (Paris, 1870); Bracquemond, *Du dessin et de la couleur* (ib., 1885); Grant Allen, *The Color Sense* (London, 1892); Rood, *Color* (ib., 1904); Kiesling, *Wesen und Technik der Malerei* (Leipzig, 1908 et seq.); Berger, *Beiträge zur Entwickelungs-Geschichte*

der Maltechnik (Munich, 1909), very exhaustive; Bouvier, *Handbuch der Olmalerei* (Leipzig, 1910); Sandford, *Manual of Color* (New York, 1910); Vanderpoel, *Color Problems* (London, 1903); Solomon, *The Practice of Oil Painting* (ib., 1911); Moreau-Vanthier, *The Technique of Painting* (New York, 1912); Grunewald, *Das Kolorit in der venezianischen Malerei* (Berlin, 1912).

COLOR. In law, in a figurative sense, a semblance or appearance of something, implying that the thing to which the term is applied has not the quality or character claimed; as, *color of title* means an apparent but not valid title.

Formerly in common-law pleading in England, when the defendant, pleading by way of confession and avoidance, confessed that the plaintiff had a prima facie or apparent right, the "confession" was said to give "color," and the defendant then pleaded matter by way of avoidance, i.e., to show that the facts pleaded by the plaintiff did not in law give ground for recovery against the defendant. See CONFESSION AND AVOIDANCE.

Color of Office is the semblance or pretense of authority, by virtue of an official position, assumed or claimed by an officer when he does some act outside of his actual jurisdiction. The term includes acts done under an honest but mistaken belief of power, as well as where one knowingly exceeds his authority. All such acts are void, and an officer who is thus guilty of an abuse of power is liable for any damages which may result from it or may be removed from office by impeachment or other appropriate proceeding. See CONVERSION; DE FACTO; FALSE IMPRISONMENT.

Color of Title is that which on its face appears to be proof of ownership, but which, by reason of some defect not easily discoverable, does not in law constitute a valid title. The term is generally used to describe a deed or will purporting to vest in the claimant the title to an estate in land. A conveyance by one so claiming title gives the vendee only such rights as the vendor has, i.e., the possession of the property under whatever title the vendor had, and a right to "tack," or add, the period of possession to make up the time necessary to gain absolute title by adverse possession. In the United States one claiming title under an invalid instrument purporting to convey a definite parcel of land may in some cases make good his claim by adverse possession to the entire parcel described, even though his actual physical possession (called *pedis possessio*) covers only a part or parcel thereof. See ADVERSE POSSESSION; TITLE (to property).

COLOR, IN PLANTS. The great majority of plants show distinct coloration, especially in aërial or aquatic organs. The absence of color is an index of parasitic or saprophytic life, but it must be borne in mind that many parasites and saprophytes are highly colored. The most common coloring matter in plants is chlorophyll, which manifests itself in various shades of green. Light of some strength has been shown to be necessary for the development of chlorophyll, though recent experiments show that it may develop in various seedlings germinated in perfect darkness, and that the synthesis of carbohydrates may take place vigorously under a dense layer of cork. The presence of plastids and favorable conditions of nutrition are necessary for the proper development of chlorophyll. Yellow coloration in plants is also commonly associated with plastids, and is due to the relative abundance of xanthophyll or carotin present as compared with the true chlorophyll. The phenomenon of yellowness is most common in dying leaves and is especially well shown in autumn. However, in many young leaves, especially where the nutrition conditions are unfavorable, yellow leaves also appear. Unfavorable nutrition is probably the cause of yellowness in most cases. In dying leaves the part near the veins usually remains green longest. In young leaves the green parts are longer and much better developed internally than are the yellow or white parts.

Red or blue coloration in plants is not directly associated with plastids, but is due to pigments that are scattered through the cell sap. The coloring substances are called anthocyans—erythrophyll if red, cyanophyll if blue. Blue colors occur most commonly in flowers, while the reds occur abundantly in leaves as well as in flowers. The red coloration of leaves has been much discussed in literature and deserves further mention. While in some plants, as coleus, red colors are more or less permanent, in most cases redness is periodic. Perhaps the three most common examples of color display are: (1) in the young actively growing leaves of seedlings or perennial shoots; (2) in wintering leaves, especially of rosette plants; and (3) in dying leaves, especially in autumn leaves. All kinds of causes have been assigned to account for periodic coloration, but by far the most satisfactory is one proposed by Overton in 1899. He has shown experimentally that an excess of sugar in nutrient solutions causes an early and rich development of color, while an absence of sugar retards this development. In the summer the products of a day's photosynthesis are commonly carried off before another day begins; but in the cool autumn nights this transfer is checked, and sugars accumulated in the leaf unite with tannin substances and cause the production of the pigments. A similar explanation, plus the great flow of sap, would account for red leaves in spring. Mechanical injury, which prevents the carbohydrate transfer, also causes an excess of sugar and gives rise to red colors. Light seems to favor color development, perhaps because it favors the increased production of carbohydrates.

Much has been said as to the ecological significance of red colors. Stahl and Kny, as a result of experiments, hold that red colors increase the available supply of heat and thus prolong the leaf activities in fall and enlarge them in spring. Kerner has also held the "protective" theory of color. If red colors do have any such function—and this is by no means proved—it must probably be regarded as quite incidental. In no case can the need for protection be regarded as a cause of the development of pigment, as one might suppose from reading various treatises on the subject of color. Consult Sorby, *On Comparative Vegetable Chromatology* (London, 1873). See CHLOROPHYLL; PHOTOSYNTHESIS; LEAF.

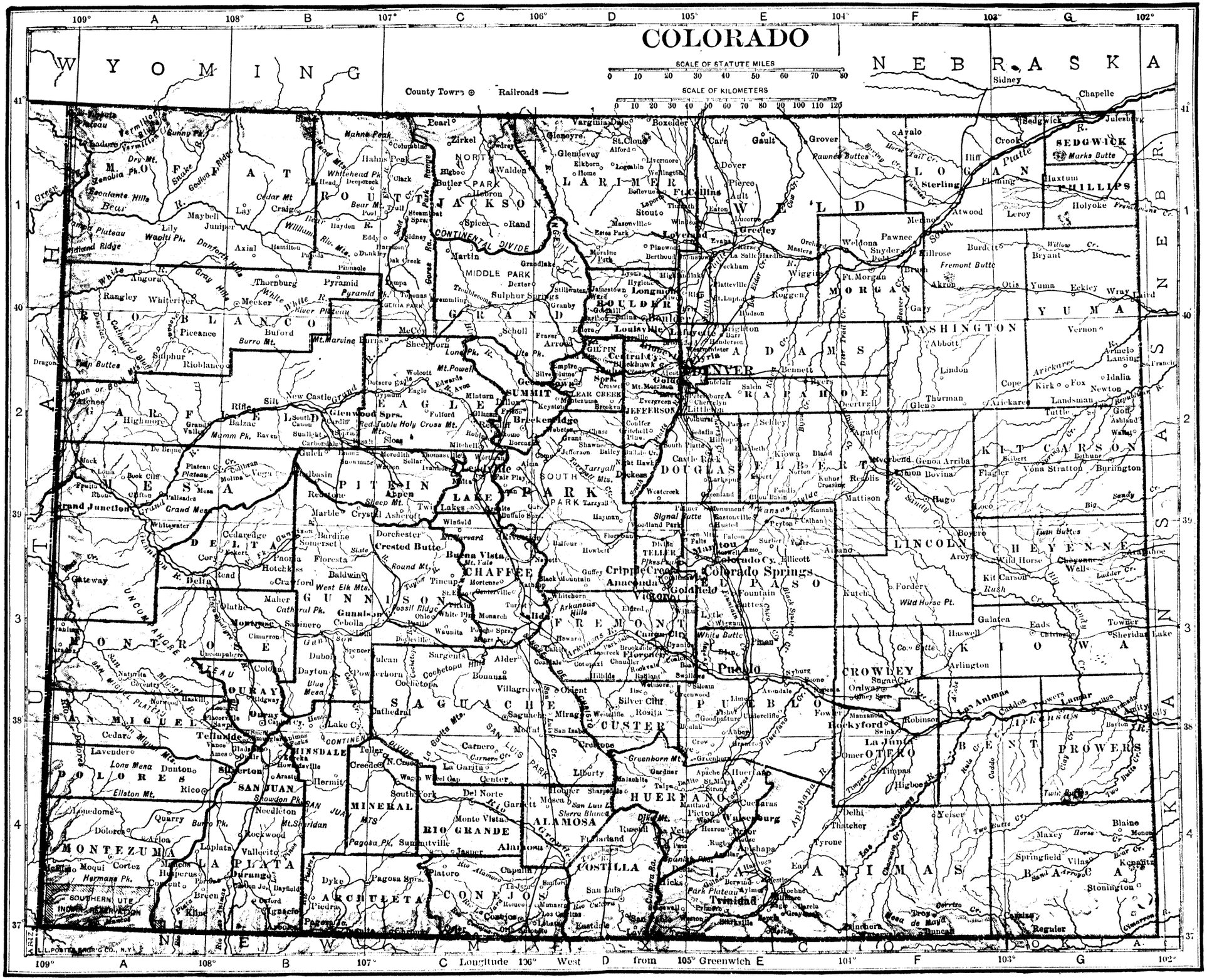
COLORADO, kŏl'ō-rä'do (Sp., colored red), "The Centennial State." A State of the American Union, admitted in 1876, the twenty-fifth in order of admission. It lies between lat. 37° and 41° N., and approximately long. 102° and 109°

W., and is bounded on the north by Wyoming and Nebraska, on the east by Nebraska and Kansas, on the south by Oklahoma and New Mexico, on the west by Utah. Longitudinal extent, about 375 miles; latitudinal extent, about 276 miles. Land area, about 103,600 square miles; water area, about 300 square miles.

Topography. Colorado lies upon the great watershed of the continent, and is, except Wyoming, the most elevated State of the Union. Several of the most prominent ranges of the Rocky Mountain system traverse it in a northerly and southerly direction. The eastern two-fifths is a portion of the region known as the Great Plains. It varies in elevation from about 3000 feet at the eastern boundary to over 5000 feet at the western edge, where it meets the foothills. It is drained by the South Platte, Arkansas, and Republican rivers, with their tributaries. Approximately in long. 105° the plains give way to chains of foothills, quite regular and in places very abrupt in the northern part of the State, more broken to the south. Back of the foothills rise abruptly the lofty ranges of the Rockies. The easternmost mountains, entering the State from the north, are called the Medicine Bow Range, and continue south as the Front Range to Pike's Peak. The crest of the Front Range is in part a portion of the Continental Divide—the waters from the east side flowing to the Mississippi and thence to the Gulf of Mexico, and those from the west side flowing westward to the Gulf of California. Pike's Peak, at the southern end of this range, is the most famous mountain in the State, but not the highest, being twenty-third in the list of 36 named peaks which reach an altitude of over 14,000 feet. Probably a dozen or more unnamed peaks could be added to the list. Over 100 other named peaks are known to rise above 13,000 feet, and at least 200 undetermined and in many cases unnamed peaks doubtless reach that altitude.

West of Medicine Bow and Front ranges are three valleys called, respectively, North Park, Middle Park, and South Park. North Park is bounded on the west by Park Range, and is separated from Middle Park by an east-west ridge which connects Park Range with Front Range and forms part of the Continental Divide. The headwaters of the North Platte River rise on the north slope of this ridge, while the waters of the south slope flow into the Grand River, thence southwestward to the Pacific. Between Middle and South parks the Front Range meets the Saguache (or Sawatch) Range, the loftiest of them all. For miles its crest towers above the 13,000-foot level, surmounted by the well-known Holy Cross Mountain (see Plate with article Holy Cross Mountain), as well as by Princeton, Harvard, Yale, and over half a dozen others whose heights exceed 14,000 feet. To the southeast the mountains are continued in the Sangre de Cristo and Culebra ranges, which extend southward into New Mexico. West of the latter ranges lies the great San Luis valley, while west of this rise the San Juan Mountains. The remainder of the west portion of the State is an area of broken mountains, plateaus, and valleys, with a general slope to the west. Many of the mountain passes are over 11,000 feet in altitude, and some of them over 13,000 feet. The great intermountain valleys or parks above mentioned are a distinguishing feature of the scenery. There are a number of smaller mountain parks, the one best known and most frequented being Estes Park, northwest of Denver, a favorite summer resort. San Luis valley extends into New Mexico, but contains in Colorado 8000 square miles, including the most level land in the State, at an altitude of about 7500 feet. Other important valleys are the Arkansas (q.v.), Rio Grande (q.v.), White, Grand, Gunnison, and Yampa (or Bear). The North Platte and South Platte rivers unite to form the Platte of Nebraska. The source of the South Platte is about 11,000 feet above sea level, and the fall in the distance to Denver is 6000 feet. The Arkansas rises over 10,000 feet above sea level, rapidly falling to 7800 feet, passing through the Royal Gorge 3000 feet deep, and flowing southeast and east into Kansas. The Rio Grande del Norte rises on the east slopes of the San Juan Range and flows through San Luis valley into New Mexico. The largest streams on the west slope are the Green, crossing the northwest corner of the State, and its tributaries, the Yampa and White; the Grand, one of the main affluents of the Colorado, and its tributaries, the Gunnison, Dolores and San Miguel. None of these streams are navigable. No other State contains the headwaters of so large a number of rivers. In the high mountains are many hundreds of small lakes, chiefly of glacial origin. Their area in many cases has been increased by artificial additions, for the storage of water for irrigation. Large reservoirs have also been constructed for the same purpose in the lower valleys and on the plains. The lofty peaks and mountain parks are equaled in grandeur by the river cañons; those of the Arkansas, Grand, Gunnison, South Platte, Boulder, Uncompahgre, Big Thompson, and others varying in depth from 1000 to 3000 feet.

Climate and Soil. The topographic features—great differences in elevation, extensive plains, high mountain ranges, and broad valleys—result in a varied, though in general mild and salubrious, climate. The high altitude of the State premises a cool temperature. In the lower portions the days are sometimes hot, but the nights are cool and free from humidity. Mean annual temperature at Fort Collins, 46.7°, July 68.2°, December 29.7°; at Pueblo, 51.1°, July 74°, December 33.7°; at Denver, 49.4°, July 71.7°, December 32°; Long's Peak Inn, 37.7°, July 55°, December 25.1°. The mean annual precipitation varies from 7 to 40 inches, according to location. In several small areas it falls below 10 inches; in about one-third of the State it is from 10 to 15 inches; in about one-third from 15 to 20 inches; in the higher mountain ranges it is from 20 to 25 inches; and in a few of the highest mountains from 25 to 40 inches. The dry climate and pure, bracing atmosphere of Colorado are considered beneficial to asthmatic and pulmonary sufferers, and the charming parks are becoming great natural sanitariums. Thousands of persons flock to the State annually to regain their health, and other thousands for recreation and the enjoyment of the scenery, hunting, and fishing. The various mineral springs are also adjuncts to the remedial nature of the climate. The hot sulphur, iron, and soda springs of Middle Park, Steamboat Springs,


COLORADO
WYOMING
NEBRASKA
KANSAS
NEW MEXICO
SCALE OF STATUTE MILES
0 10 20 30 40 50 60 70 80
SCALE OF KILOMETERS
0 10 20 30 40 50 60 70 80 90 100 110 120
County Towns
Railroads
Longitude 109° West from Greenwich
Sidney
Chapelle
Julesburg
Sedgwick
Holyoke
Atwood
Leroy
Sterling
Fleming
Haxtum
Crook
Iliff
Grover
Ayalo
Gault
Carr
Boxelder
Virginia Dale
St.Cloud
Glenyre
Glendevey
Elkhorn
Home
Livermore
Wellington
Fort Collins
Laporte
Bellevue
Timnath
Eaton
Windsor
Lucerne
Greeley
Pierce
Ault
Dover
Stout
Masonville
Estes Park
Loveland
Evans
Orchard
Masters
Weldona
Pawnee
Snyder
Dodd
Hillrose
Burdett
Willow Cr.
Bryant
Fremont Butte
Akron
Otis
Yuma
Eckley
Wray
Laird
Morgan
Ft.Morgan
Brush
Wiggins
Roggen
Gary
Plattevile
Longmont
Lyons
Hygiene
Jamestown
Ward
Nederland
Boulder
Golden
Arvada
Louisville
Lafayette
Erie
Brighton
Barr
Henderson
Commerce City
Derby
Adams
Denver
Aurora
Bennett
Byers
Lindon
Abbott
Washington
Vernon
Arickaree
Landsman
Idalia
Newton
Fox
Kirk
Cope
Thurman
Glen
Arapahoe
Deertrail
Agate
Elizabeth
Kiowa
Bland
Elbert
Genoa
Arriba
Flagler
Vona
Stratton
Burlington
Kit Carson
Lincoln
Cheyenne
Wild Horse
Kit Carson
Rush
Arroyo
Boyero
Hugo
Limon
Bovina
Matheson
Ramah
Calhan
Falcon
Peyton
Falcon
Surber
Yoder
Almono
Forders
Kutch
Wild Horse Pt.
Twin Buttes
Sandy Cr.
Big Sandy
Loco
Bethune
Republican R.
Goff
Ashland
Wallace
Arikaree
Arapahoe
Sedgwick
Marks Butte
Phillips
Logan
Platte
Jackson
North Park
Walden
Pearl
Zirkel
Hahns Peak
Columbine
Clark
Steamboat Spgs.
Routt
Bear
Yampa Plateau
Lily
Maybell
Juniper
Craig
Cedar Mt
Bear Mt.
Trull
Pool
Hayden
Eddy
Sidney
Harrison
Dunkley
Oak Creek
Pinnacle
Axial
Hamilton
Pagoda
Wadsworth Ridge
Danforth Hills
Wadsworth Pk.
Williams Fork Mts.
Gore Range
Park Range
Continental Divide
Grand Lake
Granby
Sulphur Springs
Stillwater
Dexter
Middle Park
Gran
Troublesome
Kremmling
Hot Sulphur Springs
Tabernash
Fraser
Arrow
Winter Park
Hot Sulphur Springs
Ute Pk.
Lone Pk.
Mt.Powell
Wolcott
Edwards
Eagle
Gypsum
Dotsero
Eagle
Miatorn
Red Table
Holy Cross Mt.
Fulford
Glenwood Spgs.
New Castle
Grand
Silt
Rifle
Grand Valley
Parachute
Battlement Mesa
Garfield
Mesa
Grand Mesa
Plateau Cr.
Collbran
Molina
Vega
Book Cliff
Palisade
Fruita
Clifton
Grand Junction
Whitewater
Mack
Loma
Rhone
Redlands
Redlands
Mesa
Delta
Cedaredge
Paonia
Somerset
Bardine
Floresta
Hotchkiss
Cory
Read
Delta
Gateway
Uncompahgre Plateau
Uncompahgre R.
Gunnison R.
Gunnison
Crawford
Baldwin
West Elk Mts.
Cathedral Pk.
Maher
Olathe
Montrose
Sapinero
Cebolla
Fossil Ridge
Ohio
Monarch
Waunita
Poncho Spgs.
Monte
Doyleville
Gunnison
Crested Butte
Round Mt.
Taylor
Tincup
Buena Vista
Mt. Yale
Chaffee
Hortense
Centerville
St.Elmo
Turret
Whitehorn
Arkansas Hills
Salida
Fremont
Howard
Parkdale
Coaldale
Cotopaxi
Chandler
Canon City
Florence
Rockvale
Rockdale
Radiant
Swallows
Williamsburg
Sharpsdale
Hillside
Pueblo
Bessemer
Colorado Springs
Cripple Creek
Victor
Goldfield
Anaconda
Gillett
Fountain
Security
Widefield
Fort Carson
Teller
Divide
Florissant
Balfour
Howbert
Guffey
Black Mountain
Lake George
Hartsel
Jefferson
Bailey
Buffalo Cr.
Pine
Conifer
Grizzly
Shawnee
Morrison
Mt.Morrison
Golden
Lakewood
Littleton
Englewood
Cherry Hills
Parker
Castle Rock
Douglas
Elbert
Kiowa
Elizabeth
Bijou Basin
Greenland
Palmer Lake
Monument
Palmer
Eastonville
Rustad
Falcon
Peyton
Calhan
Ramah
Limon
Bovina
Genoa
Arriba
Matheson
Simla
Agate
Seibert
Stratton
Vona
Burlington
Flagler
Kit Carson
Cheyenne Wells
Cheyenne
Kit Carson
Wild Horse
Arroyo
Boyero
Hugo
Limon
Bovina
Matheson
Ramah
Calhan
Falcon
Peyton

Wagon Wheel Gap, Manitou, Cañon City, Glenwood Springs, and Idaho Springs are famous.

The soil along the river bottoms is largely alluvial, with much light loam in the eastern part of the State. In some places siliceous and micaceous substances abound, while here and there clay formations crop out. The forests cover about 10,500,000 acres of land, restricted mainly to the mountains.

For the flora and fauna, see the paragraphs under ROCKY MOUNTAINS.

Geology. The geological structure of Colorado is extremely varied. On the eastern plains Cretaceous and Tertiary strata are exposed in nearly horizontal position and in great thickness. On the eastern flank of the mountains these formations give way to Cambrian, Ordovician, Carboniferous, Jurassic, and probably some Permian and Triassic. The lowest foothills are in most cases Cretaceous. These formations are upturned and in some places much folded. The axis of the mountain system is formed by granites and other igneous rocks, more or less metamorphosed, of Archæan age, with a great variety of later volcanic rocks. On the western edge of the system Paleozoic strata again appear, including Devonian, and are overlaid farther west by Cretaceous, Jura-Trias, and Tertiary beds. In North and Middle parks the formations are mostly Cretaceous and Tertiary, surrounded by Archæan rocks and volcanic intrusions. The Carboniferous rocks of the State, unlike those along the Appalachian Mountains, inclose no coal seams. Coal occurs, however, in great abundance in later formations—mostly Cretaceous, that in North Park, Tertiary. The great upheavals, accompanied by volcanic activity, along the Rocky Mountains have favored the formation of ore deposits, some of which are of great economic importance. Cripple Creek, Leadville, Boulder, Ouray, Aspen, Rosita, Silverton, Gilpin, Lake City, and Gunnison are important centres of gold, silver, and lead mining. Copper, zinc, manganese, and iron ores also occur in extensive deposits. During Pleistocene time the mountain valleys in all the higher ranges were occupied by glaciers for a distance averaging about 10 miles on each side of the crests. Several small glaciers are still active, the one most visited and best known to geologists being the Arapahoe, west of Boulder.

Mining. Colorado is best known as a mining State. Although it does not lead in any important mineral product, it closely approaches California in the production of gold, and in former years its yield was larger. In 1912 it ranked eleventh among the mineral-producing States in the total value of its output. The total value of mineral products in that year was $58,167,399. The chief mineral is gold, which in 1912 was valued at $18,588,562 and in 1913 at $18,395,000. Gold production has fallen off somewhat because of the exhaustion of certain rich deposits. In 1906 the production exceeded $30,000,000, and in 1908–09 the State stood first in the production of gold. California regained first place in 1910. The most important gold-producing district is Cripple Creek in Telluride County. In this district in 1912 gold was produced to the value of $11,008,362, or over 60 per cent of the production from all the deep gold mines of the State. There was an increased production of about $175,000 in 1913. Other important gold-producing counties are San Miguel, Ouray, San Juan, Gilpin, and Clear Creek. Of the gold mined 95 per cent is from siliceous ores. Many famous camps which have been large producers have become practically exhausted. These include Silverton and Ouray. At the latter place is the Camp Bird Mine, which was for a long time one of the richest and most steadily producing mines in the United States.

Coal is the mineral product of second importance. There were produced, in 1912, 10,977,824 short tons, valued at $16,345,336, compared with 10,157,373 short tons, valued at $14,747,764, in 1911. The production in 1913 was a decrease of about 1,500,000 tons over 1912. The coal fields of the State are divided by the major ranges of the Rocky Mountains into three general groups, designated as the Eastern, the Park, and the Western. The Eastern group, the most highly developed of the three, comprises the Denver region and the Cañon City and Trinidad fields. The Park group includes the little-known and almost undeveloped fields of the South, Middle, and North Park. The Western group is the largest in area and it contains the greatest amount of coal. All the fields of this group, with the exception of the Yampa field in the extreme north and the Durango field in the south, belong to the great Uinta basin, which extends from Gunnison Co., Colo., on the east, to Carbon and Emery counties, in the central part of Utah, on the west. The coal ranges from subbituminous in the Denver regions, through various grades of bituminous, including the high-grade coking coal of the Trinidad and Glenwood Springs fields, to true anthracite, in the Crested Butte and Yampa fields. Some of the coal beds are of enormous thickness. The total area underlain by coal was estimated at 17,130 square miles, and about 60 per cent of that entire region is believed to contain coal workable under present conditions. There is an extent of territory which embraces over 4000 square miles about which little is known, but which may contain workable coal, and nearly 3000 square miles of territory in which the coal lies under heavy cover and is not workable on that account at the present time. Colorado is the most important coal-producing State west of the Mississippi River and ranks seventh among all the States in production. In 1912 there were about 13,000 men employed in the coal mines.

Zinc is also mined extensively, and its production has increased considerably. In 1912 the recoverable zinc content of the ores mined in Colorado amounted to 66,111 tons, valued at $9,123,374. The product for 1913 decreased in value by $1,732,000 over 1912. Zinc mining ranks third in importance among the mining industries.

Colorado leads all the Western States in the manufacture of pig iron. The ore from which the iron is made, however, is obtained chiefly from New Mexico and Wyoming, and the value of the product is not included in the total mineral production of the State.

Silver ranks fourth in the value of the output, amounting in 1913 to $9,159,367, compared with $5,050,423 in 1912 and $3,884,989 in 1911. Silver production is largely from dry and siliceous gold and silver ores and from silver-lead ores, the principal producing coun-

ties being Lake, in which is the famous Leadville district, San Miguel, Mineral, Ouray, Pitkin, Clear Creek, San Juan, and Gilpin. The same counties furnish the larger part of the lead production, which in 1913 was over 40,000 tons, an increase in value of $377,000 over 1912. In 1912, 37,621 short tons were produced, valued at $3,385,902, compared with 34,884 short tons, of $3,135,568 value, in 1911. This quantity is that of recoverable lead content of the ore mined, not the quantity and value of the lead smelted. Other mineral industries which yield products exceeding $1,000,000 in value are stone quarrying and clay and copper mining. The value of the stone production, most of which was marble, was $1,420,607 in 1912. The clay products, exclusive of the raw clay sold, were valued at $1,437,394. Copper is produced in considerable quantities. The main output of the mineral is derived from the treatment of mixed ores, of which copper is of minor importance. These include lead-silver ores and pyritic ores rich in gold and silver. The quantity of copper thus derived in 1913 was 7,634,000 pounds. In 1912 it was 7,007,303 pounds, valued at $1,172,705, compared with 8,024,488 pounds, valued at $1,003,061, in 1911.

As a result of the interest taken in the manufacture of radium, popular attention has been directed to the production of uranium-bearing ores, from which the radium is obtained. There are two distinct varieties of these ores in Colorado—the carnotite impregnations in sandstone of the southwestern part of the State, in the Paradox valley, and elsewhere, and the pitchblende of Gilpin County. From these mines are obtained practically all the radium-bearing minerals in the United States. The State ranks first in the production of tungsten ores. These in 1912 were valued at $297,533. Other minerals produced are cement, feldspar, fuller's earth, gem materials, gypsum, iron ore, lime, natural gas, petroleum, sand and gravel, and sulphuric acid. The production of petroleum in 1912 was 206,052 barrels.

The figures of the thirteenth census, which are for the calendar year 1909, show that in that year there were in Colorado 672 mine operators with 1575 mines and quarries. The capital invested in the mining industry was $144,639,558. There were 26,743 persons engaged in these industries, of whom 24,769 were wage earners. The value of the products of the mines in that year was $45,680,135. The results of the census show that Colorado and Indiana, of the important mining States, show a decrease in mining activity. This decline in Colorado is shown not only in the value of products, but also in the amount expended for salaries and wages, which decreased 7.2 per cent since 1904.

Agriculture. The agricultural development of Colorado has had a comparatively recent beginning. Although a larger part of its area is of a character which makes the growing of crops impossible, large portions are admirably adapted for cultivation. The eastern two-fifths, which lies within the Great Plains section of the United States, is largely utilized for grazing purposes, but dry farming has been successful and irrigated portions yield large crops. Within the central mountain mass there are numerous parks and smaller valleys, the floors of which are formed from alluvial or lacustrine deposits. Wherever water is available and the altitude is not too great, these are irrigated for the production of vegetables, grain, grass, and fruit. There is little agricultural activity in the high mountainous regions except in the San Luis valley in the south-central part of the State. To the west of the divide the streams supply large volumes of water for irrigation in the valleys. The rainfall is at times considerable. To the east of the divide on the plains the rainfall is heavier, and here some crops are grown without irrigation. Wherever water is available irrigation has been introduced. The largest irrigated areas in the State are in the valleys of the South Platte and Arkansas rivers, extending from the mountains to the eastern boundary of the State.

The growth of agriculture is indicated by the following figures. The number of all farms in 1910 was 46,170, compared with 24,700 in 1900, or an increase of 86.9 per cent in the decade. Out of an approximate land area of 66,341,120 acres, the land in farms in 1910 amounted to 13,532,113 acres, compared with 9,474,588 acres in 1900, or an increase of 42.8 per cent. The improved land in farms in 1910 was 4,302,101 acres, while in 1900 it was 2,273,968 acres, or an increase of 89.2 per cent in the decade. The average number of acres per farm decreased from 383.6 in 1900 to 293 1 in 1910. The value of farm property from 1900 to 1910 shows a remarkable increase. In the latter year it was $491,471,806, while in 1900 it was $161,045,141—an increase of 205.2 per cent. The average value of all property per farm in 1910 was $10,645, and in 1900 $6520 The average value of land per acre increased from $9.54 in 1900 to $26.81 in 1910. If an earlier period is taken, the increase in the development of agriculture is even more striking. During the period from 1870 to 1910 the number of farms increased on an average over 1100 a year, and there were 26½ times as many farms in 1910 as in 1870.

In 1910 the total number of all farms was 46,170, of which 37,780 were operated by owners and managers, and 8390 by tenants. The farms operated by owners and managers in 1900 numbered 19,119, and those operated by tenants, 5581. It is significant that while there was an increase of 21,470 in the total number of farms during the decade, the number of farms operated by owners and managers increased by 18,661, while those operated by tenants increased only 2809. The great majority of the farms have been acquired by their owners or operators from the government or from private corporations, in the form of homesteads, Carey Act entries, desert-land entries, or irrigated farms. Most of these have been acquired at a small price or on long time and other favorable terms, making ownership possible to the man of small means. This fact doubtless accounts in the main for a smaller proportion of farms operated by tenants than is found in most of the older States. In 1910 the total number of farms owned or operated by tenants was 36,993, of which 26,822 were reported free from mortgage and 9636 were reported as mortgaged. The average amount of the mortgage debt per farm was $2508. The average equity per farm above the mortgage was $7706.

Over one-third of all the farms in the State in 1910 were between 100 and 174 acres in size. About one-fifth were from 260 to 499 acres. Of the total farm acreage of the State

in 1910, 36.1 per cent was in farms of 1000 acres and over, and 29 per cent was in farms of 175 to 499 acres, these being the most important size groups. Four-fifths of the farmers of the State in 1910 were native whites, and almost one-fifth were foreign-born whites. There were only 574 non-whites; of these 405 were Indians, 87 Japanese, 81 negroes, and 1 Chinese. Of the 8398 foreign-born white farmers in 1910, 1926 were born in Germany, 1128 in Sweden, 882 in England, 734 in Russia, and 643 in Canada.

The total value of crops in 1909, according to the thirteenth census, was $50,275,000. Of the total value, less than one-third (29 per cent) was contributed by cereal crops. About one-third was contributed by hay and forage, about one-eighth by sugar crops, and about one-eighth by potatoes and other vegetables. The remainder, representing 13.2 per cent of the total, consisted chiefly of fruits and nuts. The total value of crops in 1909 was 200.4 per cent greater than in 1899. This increase was due partly to higher prices. The table given below gives the acreage, production, and value of the chief crops in 1909 and in 1913. The figures for 1909 are from the thirteenth census, and those for 1913 are estimates from the United States Department of Agriculture.

		Acreage	Prod. bu.	Value
Corn	1913	420,000	6,300,000	$4,368,000
	1909	326,559	4,903,304	2,673,584
Wheat	1913	460,000	9,680,000	7,551,000
	1909	340,729	7,224,057	6,463,926
Barley	1913	100,000	3,250,000	1,820,000
	1909	71,411	1,889,342	1,100,753
Oats	1913	305,000	10,675,000	4,697,000
	1909	275,948	7,642,855	4,177,260
Rye	1913	20,000	340,000	204,007
	1909	15,715	198,025	123,530
Potatoes	1913	80,000	9,200,000	5,980,000
	1909	85,839	†1,780,674	3,704,768
Hay	1913	890,000	*824,000	18,240,000
	1909	1,285,064	2,241,566	17,282,276

* Tons.

It will be noted from this table that by far the most important crops are hay and forage, which have more than three times the acreage and three times the value of wheat, the next crop in order. The production of sugar beets is one of the most important agricultural industries, and Colorado ranks first in the country. The acreage in sugar beets in 1909 was 108,082. The production was 1,231,712 tons, with a value of $6,061,162. In 1913 the acreage was 157,000 and the production 1,800,000 tons, from which 215,000 short tons of sugar were made. Certain portions of the State are particularly adapted to the growing of vegetables and fruits of various sorts. Of these the best known are the cantaloupes, or melons, which are shipped annually in hundreds of carloads from the Arkansas River region. These include the famous Rocky Ford cantaloupes. The most important vegetable produced is the potato. The statistics of its production will be found in the table above. Orchard fruits grown include apples, peaches, nectarines, pears, plums, prunes, cherries, and apricots. The total number of trees or vines bearing orchard fruits in 1910 was 2,947,920. The total value of the product was $4,651,792. The most important fruit produced is apples. Of small fruits there was an acreage in 1909 of 2829, and the crop was valued at $398,836. The most important small fruit is the strawberry. There were, in 1910, 101,332 grapevines of bearing age, and the value of the grape crop was $28,026. A small quantity of nuts was produced.

Stock Raising. The total value of the live stock on the farms of Colorado in 1910 was $68,840,485. Cattle numbered 1,127,737, with a value of $31,017,302; horses, 294,035, with a value of $27,382,926; mules, 14,739, valued at $1,798,535; swine, 129,294, valued at $1,568,158; and sheep, 1,426,214, valued at $6,856,187. The number of domestic animals in 1913 was, according to the statistics of the United States Department of Agriculture, 3,076,863. The number of fowls of all kinds in 1910 was 1,721,445, valued at $1,012,254. The wool produced on the farms in 1909 was valued at $1,172,666.

Stock raising was the original agricultural industry of the State, and for a time it had almost the whole field to itself. The introduction of mixed farming has, to a certain extent, modified the conditions under which cattle were raised in former years. There are still large areas of semiarid land which can be utilized only for grazing purposes. Upon this land are many large farms or ranches.

That cattle raising on a large scale is decreasing is shown by the fact that in 1906 there were 1,362,303 cattle being raised for market purposes, while on Jan. 1, 1914, the number was estimated at 921,000. There were also fewer sheep grown in 1914 than in 1906, the figures for the latter year being 1,677,561 and for the former (est.) 1,668,000. Sheep raising is confined chiefly to the southern counties.

Irrigation. Of the 46,170 farms in Colorado, 25,926, or 56.2 per cent, were irrigated in 1910. The acreage of these irrigated farms was 2,792,032, or 64.9 per cent of the improved land in farms. Enterprises existing in 1910 were capable of supplying 3,990,166 acres with water, and the total acreage included in irrigation projects which were completed or under way was 5,917,457. (See IRRIGATION; RECLAMATION.) On Sept. 28, 1909, the Gunnison irrigating tunnel was formally opened by President Taft. This tunnel is a part of the largest single irrigation project undertaken by the United States government up to that time. The tunnel was driven from two points, 6 miles apart—one on the Gunnison River, whence the water supply came, and the other at Montrose in the Uncompahgre valley, on the other side of the range. Through this tunnel water to irrigate from 150,000 to 175,000 acres of land is carried. The tunnel was completed for use in June, 1910, and the complete project was nearly three-fourths completed at the beginning of 1914. The government is also carrying on preliminary work on another irrigation project in the Grand valley. It is designed to irrigate about 50,000 acres by means of tunnels from the Grand River.

Forest Products. These include firewood, fencing material, logs, railroad ties, telegraph and telephone poles, material for barrels, naval stores, etc. There were, in 1902, 2181 farms in the State reporting forest products, the total value being $305,719, compared with $113,055 in 1899—an increase of 170.4 per cent. Of the value in 1909, $137,701 was reported as

that of products used or to be used on farms themselves, $153,978 as that of products sold or for sale, and $14,040 as the amount received for standing.

Manufactures. Colorado is preëminently a mining State, but the proportion which the value of its manufactures formed of the total value of the manufactures of the United States increased steadily at each census from 1869 to 1899. From 1899 to 1909, however, this proportion decreased. In the former year it was eight-tenths of 1 per cent, seven-tenths of 1 per cent in 1904, and in 1909 six-tenths of 1 per cent. During this period of 40 years the gross value of products per capita of the entire population of the State increased from $72 to $163 in 1909. Much of the manufacturing activity such as smelting, iron and steel operations, cement manufacture, and marble and stone work, is dependent upon the development of its extensive mineral resources. Furthermore, many manufacturing establishments owe their existence to the needs of the mining industry. Irrigation of the fertile valleys of the Platte and Arkansas rivers and other streams has made the beet-sugar production of Colorado greater than that of any other State. (See *Agriculture.*) The canning industry is also the outgrowth of the development of irrigation. Coal and timber as fuel for industrial consumption and timber as manufacturing material are abundant and generally accessible. The fact that Colorado is a natural grazing country is responsible for the development of such industries as slaughtering and meat packing, the manufacture of butter, cheese, and condensed milk, the rendering of grease and tallow, and wool scouring.

The table below gives the most important data in regard to manufactures in 1909 in comparison with 1904:

COMPARATIVE SUMMARY FOR 1909 AND 1904

ALL INDUSTRIES COMBINED AND SELECTED INDUSTRIES

INDUSTRY	Census	Number of establishments	PERSONS ENGAGED IN INDUSTRY: Total	PERSONS ENGAGED IN INDUSTRY: Wage earners (average number)	Capital	Wages	Value of products	Value added by manufacture
					Expressed in thousands			
STATE — ALL INDUSTRIES	1909	2,034	34,115	28,067	$162,668	$19,912	$130,044	$49,553
	1904	1,606	25,888	21,813	107,664	15,100	100,144	37,030
Bread and other bakery products	1909	250	1,325	889	1,676	559	3,969	1,672
	1904	186	934	670	943	411	2,657	1,170
Brick and tile	1909	69	1,036	922	2,421	637	1,670	1,159
	1904	63	580	495	1,036	322	817	653
Butter, cheese, and condensed milk	1909	39	304	210	1,221	130	2,340	416
	1904	*20	141	97	593	59	1,290	209
Canning and preserving	1909	30	630	518	1,486	250	1,528	856
	1904	15	358	315	554	136	821	392
Cars and general shop construction and repairs by steam-railroad companies	1909	29	4,300	3,993	4,708	3,393	6,559	3,955
	1904	34	3,267	3,052	1,646	2,265	5,259	2,596
Confectionery	1909	35	483	349	580	136	1,023	492
	1904	19	296	239	341	105	685	391
Flour-mill and gristmill products	1909	77	429	282	4,835	220	7,868	1,196
	1904	52	362	244	2,326	203	5,783	986
Foundry and machine-shop products	1909	111	2250,	1,813	7,056	1,280	5,907	3,103
	1904	†88	1,677	1,451	3,241	1,062	4,108	2,175
Furniture and refrigerators	1909	14	224	176	494	146	542	285
	1904	11	186	157	167	137	432	254
Ice, manufactured	1909	30	315	251	2,415	190	570	444
	1904	16	182	138	1,240	93	376	305
Leather goods	1909	30	363	269	585	172	1,054	515
	1904	22	230	175	364	125	577	319
Liquors, malt	1909	11	514	424	7,327	349	3,311	2,404
	1904	11	367	300	4,702	243	2,120	1,662
Lumber and timber products	1909	263	2,614	2,190	3,472	1,458	4,185	2,789
	1904	110	1,631	1,430	1,892	896	2,497	1,691
Marble and stone work	1909	44	346	267	967	208	626	406
	1904	33	276	212	288	200	626	395
Pottery, terra-cotta, and fire-clay products	1909	6	231	214	1,079	143	436	328
	1904	11	511	476	832	268	787	491
Printing and publishing	1909	439	3,747	2,366	4,941	1,823	6,902	5,156
	1904	‡419	2,916	1,902	3,604	1,343	5,467	4,156
Slaughtering and meat packing	1909	13	834	659	3,653	389	9,657	1,362
	1904	11	303	247	1,107	175	3,324	542
Tobacco manufactures	1909	99	563	427	427	306	1,021	663
	1904	‡117	632	481	299	308	979	643

* Excluding statistics for one establishment, to avoid disclosure of individual operations.
† Excluding statistics for six establishments, to avoid disclosure of individual operations.
‡ Excluding statistics for two establishments, to avoid disclosure of individual operations.

From this table it will be noted that the industries with the largest value of products are those connected with slaughtering and meat packing. The value in 1909 was $9,657,000.

The wage earners employed in this industry numbered 659. The second in value of production were flour-mill and gristmill products, followed by the industries relating to printing and publishing. From 1904 to 1909, the number of manufacturing establishments increased 26.7 per cent, and the average number of wage earners 28.6 per cent, while the value of products increased 29 per cent, and the value added by manufacture 33.8 per cent.

The wage earners in the State in 1909 numbered 28,067, of whom 25,957 were male and 2110 were female. The wage earners under 16 years of age numbered 165, of whom 16 were females. The prevailing hours of labor for more than one-half of the wage earners employed ranged from 54 to 60 a week. Of the total number of wage earners, 22.7 per cent were employed in establishments where the prevailing hours of labor were less than 54 hours per week, and 22.9 per cent in establishments where the prevailing hours were more than 60 a week. There are only four cities in the State in which manufactures are important—Denver, with 12,058 wage earners and a product valued in 1909 at $51,538,547; Pueblo, with 1320 wage earners; Colorado Springs, 516; and Trinidad, 220.

Population. Colorado is the most populous of the Rocky Mountain States. The steady increase in population is shown by the figures by decades—1860, 34,277; 1870, 39,864; 1880, 194,327; 1890, 412,198; 1900, 539,700; 1910, 700,024. The increase in the decade 1900 to 1910 was 259,324, or 48 per cent. The State ranked thirty-second in population, the same relative rank which it held in 1900. The population per square mile in 1910 was 7.7, compared with 5.2 in 1900, and 4 in 1890. The urban population in 1910 was 404,840, and the rural population 394,184. Urban population showed an increase of 50.1 per cent in the decade 1900–10, and rural population an increase of 46 per cent. The estimated population on July 1, 1914, was 909,537.

Of the total population in 1910, 475,136, or 59.5 per cent, were native whites of native parentage; 181,428, or 22.7 per cent, were native whites of foreign or mixed parentage; 126,851, or 50.9 per cent, were foreign-born whites; and 11,453, or 1.4 per cent, were negroes. The percentage of the foreign-born population is as follows: Germans, 13.5; Italians, 11.3; Russians, 10.7; Austrians, 10.3; English, 10.2; Swedes, 9.8; Canadians, 7.5; Irish, 6.9; Scottish, 3.4; Danes, 2.2; Mexicans, 2, and all others, 12.4. The Indian population in 1910 was 1482, compared with 1437 in 1900. The Chinese numbered 373 in 1910, compared with 559 in 1900, and the Japanese, 2300 in 1910, compared with 48 in 1900. The total number of males of voting age in 1910 was 271,648, representing 34 per cent of the population. The principal cities of the State with their populations are as follows: Denver, 1910, 213,381, 1900, 133,859; Colorado Springs, 1910, 29,078, 1900, 21,085; Leadville, 1910, 7508; 1900, 12,455; Cripple Creek, 1910, 6206, 1900, 10,147. The decrease in the population of Leadville and Cripple Creek is due to the exhaustion of mines which were chiefly responsible for the settlement and growth of those cities. There were, in 1910, 27 cities having a population of more than 2500.

Transportation. Colorado has a greater railway mileage than any other of the Rocky Mountain States. On Jan. 1, 1913, there were 5871 miles of track. Of this, 4380 was standard gauge, and 1491 narrow gauge. The railroads in the State having the longest mileage are as follows: Atchison, Topeka, and Santa Fe, 512; Chicago, Burlington, and Quincy, 394; Chicago, Rock Island, and Pacific, 165; Colorado Midland, 261; Colorado and Southern, 397; Denver and Rio Grande, 970; Rio Grande Southern, 179; and the Union Pacific, 590. The electric roads include the Denver and Intermountain Railroad Company, 34 miles; the Denver and Interurban, 54 miles; the Grand Junction and Grand River Valley, 21 miles; and the Trinidad Electric Transmission Railway and Gas Company, 19 miles. The Legislature of 1909 created a State Railroad Commission, which has general charge of the regulation of railway rates. It is composed of three commissioners appointed by the Governor. There are no navigable rivers in the State.

Education. Colorado has an excellent educational system, and it is efficiently administered by the State board with the State Superintendent of Public Instruction in charge. The number of illiterates is small. The thirteenth census showed 23,780 persons, or 3.7 per cent of the population, unable to read and write. The number in 1900 was 17,779; the percentage, 4.2. The percentage of illiteracy in urban population in 1910 was 2.4 and in rural population 5.2. Among the native whites the percentage in 1910 was only 1.6. According to the census figures the total school population in 1910, ages 6 to 20 inclusive, was 215,940. Of these 147,626 were in attendance in schools. Of the number attending schools, 97,182 were of native white parentage, 42,895 were of foreign or mixed parentage, 12,070 were foreign-born whites, and 1548 were negroes. According to the school census taken in 1913 the total school population in that year between the ages of 6 and 21 was 177,428. The enrollment in the public schools in the same year was 130,948. The average daily attendance was 120,326. There were enrolled in high schools 16,377, and in graded schools below high schools 112,582. The enrollment in rural schools was 48,469. The total number of teachers in graded schools was 3683, of whom 3079 were females and 604 males. In the rural schools were 2042 teachers, of whom 1744 were female and 298 male. The average monthly salary of male teachers in graded schools was $102.45, and of female teachers $69.01. The average monthly salary of teachers in rural schools was $61.09, and for female teachers $56.19. The disbursements for educational purposes in 1912 included $3,836,166 for teachers' salaries, $1,232,254 for current expenses, $1,262,794 for building, sites, and improvements, and $13,252 for library purposes. The assessed valuation of school property in 1912 was $425,911,427. Increased attention has been given in recent years to the development of rural schools. Courses in agriculture have been introduced in several counties, and a department of rural schools has been established in the State Agricultural College. In addition to the common schools, the State supports a School for the Deaf and Blind at Colorado Springs, a State Industrial School for Boys at Golden, a State Home and Training School for Mental Defectives in Jefferson County. Provision is also made for the teaching of the adult blind outside of schools. The Legislature has made provision for the appoint-

ment of a State teacher of the adult blind, and such a teacher was appointed in 1911. The institutions for higher education include the State Normal School at Gunnison, the State Teachers' College of Colorado at Greeley, the University of Colorado at Boulder, Colorado College at Colorado Springs, College of the Sacred Heart and Colorado Women's College at Denver, Colorado Agricultural College at Fort Collins, State School of Mines at Golden, University of Denver at University Park, and Westminster College at Westminster. The University of Colorado, Colorado College, State Teachers' College, University of Denver, and Westminster College are coeducational.

Finances. The report of the State Treasurer for the biennial period, 1911–12, shows a balance in the treasury at the beginning of the period Dec. 31, 1910, of $3,309,320. The receipts for the period were $8,237,909, and the disbursements $7,383,035, leaving a balance on Dec. 1, 1912, of $4,164,195. The net floating and bonded indebtedness of the State on Nov. 30, 1912, was $2,890,544. The Legislature of 1911 created a State Auditing Board and a Tax Commission. It also provided for the revision of the revenue laws of 1902 and 1908.

Banks. There were in the State, on June 14, 1912, 127 national banks, with deposits subject to check amounting to $56,310,371, and savings deposits amounting to $4,051,179. There were 136 State banks with deposits subject to check amounting to $7,516,205, and savings deposits of $1,171,509. The savings banks numbered 8, with 14,955 depositors and deposits aggregating $2,816,070. In addition to these there were 25 private banks with deposits subject to check amounting to $1,852.660, and savings deposits amounting to $147.870.

Charities and Corrections. The charitable and correctional institutions under State control include the Home for Children, Soldiers' and Sailors' Home, Workshop for the Blind, State Hospital, State Home and Training School for Mental Defectives, Boys' Industrial School, Girls' Industrial School, State Penitentiary, and State Reformatory. For the maintenance of the above institutions for the biennial period ending Nov. 30, 1914, there was appropriated the sum of $882,000, and for improvements, $95,500. Largely through the efforts of Judge Ben B. Lindsey, the Legislature in 1909 passed a bill providing that delinquent children shall come under the chancery powers of the courts of record. The bill provided for a referee to be called the Master of Discipline to hear cases of delinquency and dependency when it is practicable to try the same before the chancery side of the court. The same Legislature also passed bills to supplement and strengthen existing acts punishing those charged with juvenile delinquency. Another bill, actively supported by Judge Lindsey, passed at this session created a probation court, wherein it is lawful for the judge of the court to hear evidence in relation to all matters properly put before it, to fix the amount of damage committed by the person charged with the offense, and, with the consent of the person in whose interest the proceedings were begun, to order reparation to be made by him to the person suffering such damage by the return of the property taken or payment of the damage done. The Legislature of 1911 passed a measure permitting the State Soldiers' and Sailors' Home to admit Confederate veterans. This Legislature also provided for the parole of prisoners in county jails for good conduct and work, and for the employment of prisoners in jails. Half of any prisoner's earnings by this enactment is to go to his dependent wife and children. The same Legislature also passed the child-labor laws to forbid any child under 14 being employed in a theatre, or in places of amusement where intoxicating liquors are sold, or in any other places; a child of this age must have a permit to work on a farm or an orchard. No child under 14 may be employed during school hours or before 7 A.M. or after 8 P.M., and 8 hours is the maximum for child labor. The Legislature of 1913 also enacted several important bills relating to the work of charities and corrections. These provided for the regulation of the sale of cocaine, and the registering of tuberculous persons, and forbade the publication of trial, etc., where children are involved. At the general election of 1912, through the operation of the referendum, a mother's compensation law was carried. Other measures passed by referendum at this election were those providing for a more extended civil service, and limiting the hours of work for women. In 1913 a home for the blind was established at Denver. An international white-slave association was also organized in that city.

Militia. The militia organizations of the State include two regiments of infantry of 11 companies each, one squadron of three troops of cavalry, one battalion of two batteries of field artillery, one company of engineers, one company of signal troops, and three detachments of sanitary troops. The total strength of enlisted men in 1913 was 1309, and of officers 137. The official designation is the Colorado National Guard.

Government. The constitution was adopted by a vote of the people Aug. 1, 1876. By a two-thirds vote of each House a proposed amendment may be referred to popular vote, but amendments must be voted upon separately. A proposal for a constitutional convention may also be referred to the people by a two-thirds vote of each House, and if a majority of the people approve, the next session of the Legislature must provide for such convention. It must consist of twice as many delegates as there are members of the Senate, and the constitution drawn up must be submitted to the people for ratification.

Suffrage and Elections.—Since 1893 women have had suffrage in Colorado on equal terms with men. The constitution specifies 12 months' residence as a principal requisite to voting and authorizes the Legislature to make other time requirements. At a special session of the Legislature held in 1910 a direct-primary election law was passed. This provides for nominations by direct-primary elections except for municipal officers and delegates to national assemblies or presidential electors. According to provisions of this law political parties have separate tickets, and all candidates for nominations are placed on a direct-primary ballot by petition or certificate of designation. All party direct-primary elections are to be held at the same time and place, and all voters must register before they have the privilege of voting. All direct-primary elections are conducted under the general election laws of the State as far as the provisions of these laws are applicable. The law contains provisions regulating campaign expenses. Personal expenses for candidates for United States Senator are limited to $5000, the

candidate for House of Representatives or a State office to $2500, and for any other office to $1000. Candidates are obliged to file sworn statements of expenses. Candidates for United States Senator are nominated at direct-primary elections. Candidates for State Senator or member of the State House of Representatives are given the privilege of making a declaration of their purpose to vote for candidate for United States Senator who has received the highest number of the people's vote of that office at the general election next preceding the election of the Senator of Congress, without regard to individual preference. Severe penalties are prescribed for the bribery of voters and for other election offenses. The election commission in cities having special charter providing for such commission are given all the powers of jurisdiction and perform all the duties provided by this act in respect to county clerks, city or municipal clerks, and members of county commissions or any other election officials or members subject to the general laws of the State except as otherwise specifically provided by their charters. The Legislature of 1913 passed an elaborate act regulating the registration of voters previous to election. Voters, except for school election, must register 10 days or more before the election. The Legislature of 1913 ratified the seventeenth amendment to the constitution providing for the direct election of Senators, and passed a measure permitting the Governor to make temporary appointments in case of vacancy, and prescribing the method by which elections for Senators are to be held. An amendment to the constitution carried in 1912 provided for the recall of all elective officials.

Legislative.—State elections are held on the first Tuesday in October of even years, and the Legislature meets on the first Wednesday of the following January. Senators and Representatives are elected for terms of four and two years respectively. The aggregate number of Senators and Representatives can never exceed 100. No bill can be so altered or amended on its passage through either House as to change its original purpose. Revenue bills must originate in the House of Representatives. Ordinary expenses only can be included in general appropriation bills. A member cannot vote on a bill in which he has a personal or private interest. In 1910 constitutional amendments providing for the initiative and referendum were adopted by the people. This law in its essentials is similar to that of Oregon (q.v.). It was declared invalid by the district court on Aug. 23, 1912, but was held constitutional by the State Supreme Court on September 23 of the same year.

Executive.—The executive officers are a Governor, Lieutenant Governor, Secretary, Auditor, Treasurer, Attorney-General, and Superintendent of Public Instruction, the term of each being two years. Their salaries are determined by law, and neither Treasurer nor Auditor can be his own immediate successor. A two-thirds vote of both houses overrules the veto of the Governor. The Governor may veto any item of a money appropriation bill. He may grant reprieves, commutations, and pardons, and convene the General Assembly in special session. The Lieutenant Governor, who is President of the Senate, succeeds to the governorship in case of vacancy.

Judicial.—The judicial power of the State as to matters of law and equity, except as in the constitution otherwise provided, is vested in a supreme court, district courts, county courts, justices of the peace, and such other courts as may be provided by law. There are three supreme court judges, elected for nine years; the district judges—one or more for each judicial district—elected for six years; and a judge for every county, elected every four years. The Legislature of 1911 created a court of appeals to consist of five judges appointed by the Governor for a term of four years. This court is to supplement the work of the Supreme Court, which may transfer cases to it. A constitutional amendment adopted in 1912 provided for the recall of judges and certain judicial decisions.

Local Government.—Three county commissioners (five permissible in counties exceeding 70,000) are elected in every county, the term of office being four years. Other county officers, elected on the first Tuesday in October of the even years, are: clerk, sheriff, coroner, treasurer, superintendent of schools, surveyor, and assessor. Towns and cities may be classified into not more than four classes, and the powers of each class are defined by general laws. Cities and towns have been granted the power to adopt a commission form of government. At the end of 1913 the following towns and cities were under this form of government: Colorado City, Colorado Springs, Denver, Durango, and Pueblo. Most of the charters of these cities include provisions for preferential voting on ballots for commissioners. Voters may mark candidates as first, second, or third choice. Charters for the most part contain also provisions for the initiative, referendum, and recall. A constitutional amendment adopted in 1912 gave cities and towns home rule in municipal affairs.

History. Prehistoric remains, similar in character to those discovered in New Mexico and Arizona, have been found in southern Colorado. In the second half of the eighteenth century several expeditions into the limits of the present State were undertaken by the Spaniards. The most important of these was the one headed by Francisco Escalante, who in 1776 traversed the southwestern corner of the State and explored the region of the Dolores and Gunnison rivers. But though Spain claimed the region, she attempted no settlement. The country, a portion of which was included in the Louisiana Purchase (1803), was partially explored in 1806–07 by Captain Pike and in 1820 by Colonel Long. Further exploration was carried on by Frémont in 1842 and 1844, and before the Mexican War fur-trading stations had been built on the Arkansas and Platte rivers. In the Treaty of Guadalupe-Hidalgo (1848) Mexico relinquished her territorial rights to the United States. Prospectors and emigrants from Georgia and Kansas entered Colorado in 1858. In 1859 the discovery of gold near Boulder and Idaho Springs was followed by a large immigration and the sudden rise of the mining towns of Denver and Boulder. The region, together with lands taken from Nebraska and New Mexico, was organized into the Territory of Colorado on Feb. 28, 1861. From 1864 to 1870 wars were waged with the Cheyenne and Arapaho Indians. The Utes ceded the mountain and park regions between 1863 and 1880. In 1864 and 1868 unsuccessful attempts at organizing a State government were made. The final enabling act was passed by Congress on March 3, 1875, and on Aug. 1, 1876, Colorado was admitted into the Union. Gold digging was on the decline in 1878, and many mining towns

were being deserted, when it was discovered that from the masses of carbonates discarded by the gold seekers silver and lead might be extracted. Immigrants flocked to Leadville, and soon the value of the lead and silver output came to excel the yield of gold. Serious strikes broke out among the miners in 1894, 1896–97, and 1904, and recourse was had to military force to restore order. The greatest disturbance was that of 1904, during which the strikers blew up the railway station at Independence, killing fifteen non-union miners and injuring several others. In an endeavor to quell the disorder suspected persons were deported from the State, attempts were made by the soldiery to intimidate the courts, and the writ of habeas corpus was suspended by the Governor. These measures, which aroused much criticism throughout the United States, were largely actuated by the Citizens' Alliance, an organization formed with the avowed purpose of exterminating the Western Federation of Miners. From 1876 to 1888 Colorado was Republican in national politics, but on the free-silver issue it was carried by a fusion of Populists, Democrats, and Silver Republicans in 1892, 1896, and 1900. In 1904 the State again gave its electoral vote to the Republicans. The State election in 1904, however, was bitterly contested. The attitude of Governor Peabody, the Republican candidate, during the mining troubles, lost him the support of a large part of the labor element, and the returns showed the election of Adams, Democrat. A contest ensued, and the Republican Legislature seated Peabody, who resigned immediately afterward and was succeeded by McDonald, the Lieutenant Governor.

In 1906 Henry A. Buchtel, a Methodist Episcopal clergyman and chancellor of the University of Denver, was elected Governor on the Republican ticket. The Legislature of 1907 elected Simon Guggenheim, one of the heads of the American Smelting and Refining Company and a capitalist of national repute, United States Senator. In the presidential election of 1908 Bryan received 126,772 votes; Taft, 123,732. In this year the Democrats elected their first Governor since 1905. J. F. Shafroth, Democrat, received 128,898 votes, against 118,832 cast for McDonald, the Republican candidate. The Democratic National Convention of 1908, which nominated Mr. Bryan, was held in Denver July 9–14. An auditorium costing $650,000 and seating 10,000 persons was erected for the purposes of the convention. The Legislature of 1909 elected Charles J. Hughes, Democrat, United States Senator, to succeed H. M. Teller. On September 28 of this year the Gunnison tunnel, a part of the Uncompahgre irrigation project, was formally opened by President Taft, who was at that time making a tour of the Western States. (See paragraph *Irrigation* above.) In 1910 Governor Shafroth was re-elected. Senator Hughes died on Jan. 11, 1911. The Legislature was in a deadlock over the election of his successor throughout the entire session and was obliged to adjourn without an election, and Colorado was represented in the sixty-second Congress by only one Senator. In December, 1912, Senator Guggenheim announced that he would not be a candidate for reëlection. This necessitated the election of two Democratic Senators by the Legislature of 1913. John F. Shafroth was elected for the full term, and for the short term Charles S. Thomas, who was Governor of the State from 1899 to 1901, was chosen. In the presidential election of Nov. 5, 1912, Wilson received 114,223 votes, Roosevelt 72,306, Taft 58,386, and Debs 16,418. For Governor, E. A. Ammons, Democrat, received 101,293 votes; Costigan, Progressive, 63,035; Parks, Republican, 54,724. The Democrats elected all Representatives to Congress. The Legislature of 1913 was Democratic by more than 40 on a joint ballot. By the reapportionment as a result of the census of 1910, the State has four Representatives in Congress instead of three as formerly. There were serious strikes in the mining regions in the early part of 1914. For an account of these, see STRIKES.

TERRITORIAL GOVERNORS

William Gilpin	1861–62
John Evans	1862–65
Alexander Cummings	1865–67
A. C. Hunt	1867–69
Edward McCook	1869–73
Samuel H. Elbert	1873–74
Edward McCook	1874–75
John L. Routt	1875–76

STATE GOVERNORS

John L. Routt	Republican	1876–79
Frederick W. Pitkin	"	1879–83
James B. Grant	Democrat	1883–85
Benjamin H. Eaton	Republican	1885–87
Alva Adams	Democrat	1887–89
Job A. Cooper	Republican	1889–91
John L. Routt	"	1891–93
Davis H. Waite	Populist and Democrat	1893–95
Albert W. McIntire	Republican	1895–97
Alva Adams	Democrat and Silver Rep.	1897–99
Charles S. Thomas	Dem., Pop., and Silver Rep.	1899–1901
James B. Orman	" " " " "	1901–03
James H. Peabody	Republican	1903–05
Alva Adams	Democrat	1905–
James H Peabody	Republican	1905–
Jesse F. McDonald	"	1905–07
Henry A Buchtel	"	1907–09
John F. Shafroth	Democrat	1909–13
Elias A. Ammons	"	1913–

Consult: Bancroft, *History of the Pacific States*, vol. xx (San Francisco, 1890); Hayes, *New Colorado and the Santa Fé Trail* (New York, 1880); Pabor, *Colorado as an Agricultural State* (ib., 1883); *The Resources, Wealth, and Industrial Development of Colorado* (Denver, 1883); *Labor Disturbances in the State of Colorado from 1880–1904*, etc. (58th Congress, 3d sess., Senate doc. 122); Snook, *Colorado History and Government* (Denver, 1904); Parsons, *A Guide to Colorado* (1911); Mills, *The Spell of the Rockies* (1911).

COLORADO. A city and the county seat of Mitchell Co., Tex., 262 miles by rail west-southwest of Dallas, on the Colorado River and on the Texas and Pacific Railroad (Map: Texas, B 3). It is the commercial centre of a cotton-growing and stock-raising region, carries on a trade in sand and gravel, and has extensive salt works and cotton gins. The water works are owned by the city. Pop., 1910, 1840.

COLORADO, *Sp. pron.* kō'lō-rä'ᵺo. A name given by the Spaniards to various unrelated tribes in different parts of Spanish America, including Texas, owing to their custom of painting the body with red pigment. Of the tribes thus known, one of the most noted was that of the Sacchas, "men," as they call themselves, of whom a few still survive in the upper valleys of the Daule and Chones rivers, in northwestern Ecuador. They go naked and are naturally light-skinned, almost blond, but paint their whole bodies with a red paint. They belong to the Barbacoan stock.

COLORADO, Río, rē'ō. A river of central

Argentina, rising in the Andes and flowing southeast. It empties into the Atlantic in about lat. 39° 50′ S. (Map: Argentina, E 11). Its entire length is about 700 miles, but it is navigable for light vessels for only 200 miles. The upper course is through a desert.

COLORADO, UNIVERSITY OF. An institution of higher learning situated at Boulder, Colo. It was incorporated by the Territorial Legislature in 1861, and in 1876 the constitution of Colorado provided for it as the State University. At the formal opening of the institution in 1877 it consisted of a College of Liberal Arts and a preparatory department (the preparatory department was discontinued in 1907). The university in 1914 comprised the following schools and colleges (with date of establishment): the College of Liberal Arts, 1877; School of Medicine, 1883; Graduate School, 1892; School of Law, 1892; College of Engineering, 1893; Summer Session, 1904; College of Commerce, 1906; College of Education, 1908; School of Pharmacy, 1911; University Extension, 1912; and School of Social and Home Service, 1912. The following degrees are offered: B.A., M.A., Ph.D., M.S., C.E., E.E., M.E., D.Oph., M.S. in Public Health, Doctor of Public Health, M.S. in Sanitary Engineering, B.S. (C.E.), B.S. (E.E.), B.S. (M.E.), B.S. (Ch.E.), M.D., Ph.C., B.Phar., B.S. in Phar., LL.B. The university is coeducational. The library contains 75,000 bound volumes besides maps and pamphlets. The total registration in 1913–14, not including the Extension Division and the Summer Session, was 1250. The university is supported by a two-fifths mill tax and special appropriations. Its government is vested in a board of six regents elected by the people. The president in 1914 was Livingston Ferrand, A.B., M.D.

COLORADO CITY. A city in El Paso Co., Colo., 75 miles south of Denver, on the Colorado Midland and the Denver and Rio Grande railroads (Map: Colorado, E 3). It contains gold-reduction works, railway shops, and an iron foundry, and has a Carnegie library. The commission form of government was adopted in 1913. Pop., 1900, 2914; 1910, 4333.

COLORADO COLLEGE. An institution of higher education, founded at Colorado Springs, Colo., in 1874. The college offers courses leading to the bachelor's degree in arts, science, and philosophy. The college has departments of engineering, forestry, and of business administration and banking. It has 14 large stone buildings, costing $1,000,000 with their equipment. The library contains 110,000 volumes, and the endowment is $1,040,000. In 1913–14 it had 679 students, with standards the same as the best Eastern institutions. It has a system of exchange instructors with Harvard University. The president in 1914 was W. F. Slocum, LL.D., D.D.

COLORADO DESERT. A portion of the great arid region of southeastern California and the contiguous part of Nevada, generally known as "the Desert." The more important subdivisions of this region are called the "Colorado Desert," the "Mohave Desert" (q.v.), and "Death Valley" (q.v.). The Colorado Desert extends southward from San Gorgonio Pass (between the San Bernardino and the San Jacinto mountain ranges). Its general northern boundary is roughly outlined by the San Bernardino, Cottonwood, Chuckwalla, and Chocolate mountain ranges, north of which lies the Mohave Desert. It comprises about 2000 square miles and includes chiefly the western portion of Riverside County, the eastern portion of San Diego County, and the western half of Imperial County. Much of this region lies below sea level; the lowest area is the Salton Sink, within which lies the Salton Sea (q.v.). The Salton Sink, in a comparatively recent geological period, was a part of the Gulf of California, from which it is now separated by the delta of the Colorado River. Topographically this entire desert area is characterized by a series of approximately parallel mountain ranges, between which lie desert valleys. The trend of these mountains in the northern part of the desert is north and south, or nearly so, while the ranges in the southern part swing to the southeast.

The desert is due chiefly to the effect of the Sierra Nevada Mountains, which condense upon their westward slopes practically all of the moisture in the winds from the Pacific. During the five summer months the heat in the desert valleys is intense, frequently reaching 125° F. in the shade and rarely falling below 70°, the average being about 90°. Men subjected to these conditions without water (of which very little is to be had) generally perish quickly. Rain falls frequently upon the mountains, and sometimes in the valleys, but the air generally is in active movement, and the winds quickly dry the surface of the ground. Sudden cloudbursts, accompanied by startling electrical displays, are not uncommon in the mountains, where the resulting flood waves develop enormous erosive and transporting energy. Railroads traversing this country are often damaged by these storms. The normal rainfall for the desert is between three and four inches annually. For a description (with a good map) of this region, consult Mendenhall, "Some Desert Watering Places in Southeastern California and Southwestern Nevada," *Water-Supply Paper 224, United States Geological Survey* (Washington, 1909); also the authorities cited under CALIFORNIA.

COLORADO RIVER OF THE WEST. A large river flowing through the plateau region of the southwestern United States. It is formed in the southeastern part of Utah by the junction of the Green River from the north (the upper continuation of the Colorado) and the Grand from the northeast, the former rising in southwestern Wyoming in the Wind River Mountains, and the latter in the north-central part of Colorado (Map: United States, C 3). These head streams receive numerous tributaries from the well-watered heights of the Rocky Mountains and the Wasatch. These streams are extraordinary, but below their junction the Colorado passes through what is in some respects the most remarkable region on the earth, not only for its natural scenery, but also for the great interest which it possesses for geologists, as it gives on a mighty scale the clearest exemplifications of the action of erosive forces in shaping the contour of the land and presents vertical structural sections of vast extent unmasked by vegetation. In the Eocene epoch the whole region of Arizona, Utah, and Nevada was subjected to a vast upheaval, and what was formerly the bottom of the ocean was raised to a height of more than 10,000 feet above sea level. This region, consisting chiefly of horizontal strata of the Paleozoic and Meso-

zoic systems, was subjected to extensive denudation by wind and water, and again to successive upheavals accompanied by volcanic action. In the northwestern part the strata were faulted into huge blocks, running north and south, giving the present shape to the mountains of Nevada. The result of the uplifting and erosion was the washing away of the weaker and softer strata, especially to the west of the present course of the Colorado, while those rocks that were protected by harder layers were left standing as extensive plateaus with precipitous escarpments. In some places lavas have been thrust up through the strata by volcanic action, and volcanic cinder cones and craters are numerous, one small lava flow in the Uinkaret locality being so recent that no vegetation has found root on it. For a time the Colorado itself was dammed up by a lava overflow from above at this place. The precipitation is heaviest on the high mountains, diminishing according to altitude; and, in a general way, also according to latitude, towards the southwest, where in the valleys it is very light, in places less than 5 inches. Denudation therefore proceeds much more rapidly along stream beds, even where these, as is frequently the case, are dry for a great part of the time, with the result that the stream beds are depressed to great depths below the surrounding levels, giving rise to a multitude of profound gorges or cañons. These begin with Flaming Gorge on Green River, near the south boundary of Wyoming where the river cuts into the Uinta Mountains, and they encompass the river and its tributaries, with few breaks, for 1000 miles, to the foot of Black Cañon. Grand River flows through similar cañons and joins the Green in a gorge 1300 feet below the general surface of the plateau. The largest, longest, and deepest of these remarkable chasms is the famous Grand Cañon of Arizona, in the northern part of that State, where the Colorado passes through an enormous uplift called, south of the cañon, the Colorado Plateau, and north of it, the Kaibab, Kanab, Uinkaret, and Shiwits plateaus, differentiated by variations of altitude from about 6000 to 8500 feet above the sea. The Grand Cañon, 217½ miles long, 4000 to 6000 feet deep, and from 1 or 2 to 15 miles wide at the top, is immediately preceded in the series by Marble Cañon, 65½ miles long, 3500 feet in its maximum depth, and ½ mile to 2 miles wide at the top, with only a nominal separation from the Grand Cañon, thus making a continuous chasm 283 miles long as the river runs. In two of its sections the Grand Cañon is made up of two distinct chasms: an inner, cut in archean rock, and an outer in sedimentary rock, the latter being very wide and the former very narrow. This is mainly caused by the disparity in hardness of the rocks, as is evident from the fact that where the trend of the river eliminates the archean formation there is no defined inner gorge, although in other parts the main chasm is flanked above by a line of cliffs marking the summit of the plateau, and set some distance back, the level interval being called the esplanade. Everywhere the configuration is due to structural conditions acted on by weather and water.

The Grand Cañon ends at the Grand Wash, where the cliffs retreat north and south, terminating the great plateau. Several minor cañons follow, and at about 113° 45′ the river swings sharply to a straight south course, passes through the last important gorge, Black Cañon, and flows thenceforth with less declivity in comparatively open country all the way to the Gulf of California. It forms here the boundary between Arizona and Nevada and California. The river is navigable for properly built steamboats of light draft as far as the foot of Black Cañon, but the enormous quantity of shifting silt makes progress uncertain. The first white man on the river was Hernando Alarcon, commander of the marine division of the Coronado expedition, who discovered its mouth in 1540 and ascended in small boats to about the thirty-fourth parallel. The same year Cardenas, in command of one of Coronado's land divisions, came to the south rim of the Grand Cañon. In 1776 Padre Escalante, coming from the northwest, crossed about where latitude 37° intersects the river, and this place ever since has gone by the name of "Crossing of the Fathers." In 1825 General Ashley took his band of trappers in boats down the Green as far as Brown's Park, and in 1849 William L. Manly, with several others, went in a boat from the emigrant crossing near the present Union Pacific bridge down to the Uinta valley. One or two other parties attempted to descend about this time. The name "D. Julien, 1836" is carved into the rock in three places in the cañon near the junction of the Green and Grand, but that is all that is known about Julien. Early in 1858 George A. Johnson, who for several years had navigated between Fort Yuma and the Gulf with steamboats, took one, named the *General Jesup*, as far up the river as the head of Black Cañon, about lat. 36° 05′. On his return he met the government expedition under Lieutenant Ives, with the steamer *Explorer* on the way up. Iyes got to the foot of Black Cañon with his steamer. In 1866 Captain Rodgers took the steamer *Esmeralda* as far up as Callville (about to Johnson's limit), and the next year, 1867, a man named James White was picked up at Callville in a famished, exhausted condition, whose story led to the belief that he had come down through the Grand Cañon. The fact is that he entered on the river below the end of the great gorge, and his story shows that he knew nothing about it, but at that time neither did any one else; he actually knew very little about any of the country.

The first human beings of any color or condition known to have made the passage of the Grand Cañon were Major John Wesley Powell and the remnant of his party which had started from Green River, Wyoming, May 24th, 1869, reaching the mouth of the Virgin August 30th. In 1871–72 Powell made a second descent, this time for the government. In 1871 Lieutenant Wheeler, U. S. A. Topographical Engineers, proceeded up the river with boats, from Fort Mohave, going as far as the mouth of Diamond Creek, by means of much pulling, towing, and dragging over portages. Twenty years later (1889) F. M. Brown started a railway survey along the river from Blake, Utah. He and two of his men were drowned in Marble Cañon, and the expedition failed, but R. B. Stanton reorganized it with better boats and completed the descent the next year. Others have in recent years been the entire length of the river; but it is always a hazardous undertaking.

The total length of the stream from the head of the Green is about 2000 miles; from the junction of the Grand, about 1100. The area drained is approximately 300,000 square miles. The declivity is very great, the total river fall from the Union Pacific crossing to the end of the Grand Cañon being 5235 feet. The river fall in Marble-Grand Cañon is 2330 feet. Rapids are counted by hundreds. The sharpest single descent is the Sockdologer Rapid, with a fall of about 35 feet in one-third of a mile, in the Grand Cañon. The river varies in width from hardly 75 feet in places among the rocks to a quarter of a mile in open places and more in the lower reaches. The depth changes with the seasons and with locality. In the narrowest parts of the Grand Cañon it is at times more than 100 feet. The great rise occurs in May and June, but rains in July frequently cause sudden and great increase in volume. The velocity of the current is sometimes more than 25 miles an hour. Consult: Report of Lieut. J. C. Ives on the *Exploration of the Colorado River* (1861); J. W. Powell, *Exploration of the Colorado River of the West and its Tributaries* (1875); F. S. Dellenbaugh, *A Canyon Voyage* (1908), giving the only story of Powell's second descent; id., *The Romance of the Colorado River* (history); C. E. Dutton, "Tertiary History of the Grand Canyon of the Colorado," in *Monograph II, United States Geological Survey* (1882); the various writings of William Morris Davis; G. W. James, *In and Around the Grand Canyon* (1902); id., *The Grand Canyon of Arizona, How to See It* (1910).

COLORADO RIVER. A river rising in the western part of Texas, near the southeastern boundary of New Mexico (Map: Texas, C 4). It flows in a generally southeast direction across the State and empties into the Gulf of Mexico through Matagorda Bay. Its chief tributaries (all received from the west) are, from north to south, the Concho, San Saba, and Llano, which enter the main stream in the counties of the same name. The Concho supplies a steady volume of water greater in amount than that of the Colorado at their confluence, furnishes much water power, and serves efficient irrigation systems in Irion and Tom Green counties. The drainage of the Colorado embraces about 37,000 square miles above Austin, and about 40,000 square miles above Columbus. At Austin the river emerges from a cañon, and has a discharge of about 70,300 second feet. Below this point it flows through a generally level country, where it supplies water power and is used for rice irrigation, especially in Colorado, Wharton, and Matagorda counties. The river is about 900 miles long and is navigable for steamboats to Austin. The other chief towns on its banks are Bay City, Wharton, Columbus, Lagrange, and Bastrop. It is frequently called the "Eastern Colorado," to distinguish it from the larger and better-known river—the Colorado River of the West—which empties into the Gulf of California.

COLORADOS. An important tribe of Indians belonging to the Barbacoan stock (q.v.) and living on the upper courses of the rivers Esmeraldas, Daule, and Vinces, in northern Ecuador. They have been studied by Selee, Gonzalez Suarez, Beuchat, and Rivet. See BARBACOAN.

COLORADO SPRINGS. A city and the county seat of El Paso Co., Colo., 74 miles south by east of Denver, on the Atchison, Topeka, and Santa Fe, the Denver and Rio Grande, the Chicago, Rock Island, and Pacific, the Colorado and Southern, the Colorado and Midland, and the Colorado Springs and Cripple Creek District railroads (Map: Colorado, E 3). Its location, 6000 feet above sea level, near the base of Pike's Peak and the celebrated mineral springs at Manitou, have made the place one of the most popular health resorts in the United States. It is the seat of Colorado College, founded in 1874, and contains the Colorado School for the Deaf and Blind, the Union Printers' Home (international), national sanitarium of the Modern Woodmen of America, and the Myron Stratton Home for the Poor. There are many places of historic and scenic interest in the vicinity, notably Pike's Peak (q.v.), Ute Pass Highway, Garden of the Gods (q.v.), an old Indian trail, Cripple Creek, North and South Cheyenne Cañons, Glen Eyrie, Cave of the Winds, and Phantom Cliff Cañon. The city has also a beautiful system of parks, comprising 3000 acres. The chief industries are the refining and reduction of ores, coal mining, and the manufacture of tile and pottery. Settled in 1871, Colorado Springs was incorporated in 1872 and is governed under a special charter, adopted in 1909, which provides for the commission form of government. The city owns its water system, valued at $3,000,000, which brings from the streams and reservoirs on the slopes of Pike's Peak water noted for its purity. Pop., 1890, 11,140; 1900, 21,085; 1910, 29,078.

COLORADO STATE AGRICULTURAL COLLEGE. A scientific school of agriculture and the mechanic arts, situated at Fort Collins, Colo., organized in 1876. The college received 90,000 acres of the lands granted to the State in 1862, and since its inception has been supported chiefly by a State tax and acts of Congress. Its gross income is about $170,000. It offers courses leading to the B.S. and M.S. degrees in engineering, agriculture, and home economics. It also includes a School of Veterinary Medicine, requiring four years to gain the degree of D.V.S. Women are admitted on equal terms with men. The library contains about 50,000 volumes. The attendance in 1913 was about 500 in collegiate grade. It also conducts a School of Agriculture of secondary grade with an attendance of over 400, and a Conservatory of Music with an attendance of over 100. The activities of the college are divided into education, research, and extension. The president in 1914 was Charles A. Lory, LL.D.

COLORATION IN ANIMALS. See BIRD; INSECT; PROTECTIVE COLORATION; MIMICRY.

COLOR BLINDNESS, ACHROMATOPSIA, or DALTONISM. An incurable defect of vision, owing to which some persons are unable to distinguish certain colors. The name "Daltonism" is derived from Dalton, the English chemist who, in 1794, discovered the condition and himself suffered from the defect. Acquired color blindness is a symptom of diseases of the optic nerve and retina. Congenital color blindness usually affects both eyes and is often hereditary, and may be partial or complete. It is found in from 3 to 4 per cent of men and less than 1 per cent of women. It occurs in eyes whose power of vision may be otherwise (as to form and distance) perfect, but errors of refraction usually coexist. It is usually partial, being a

failure to distinguish one or two of the fundamental colors—red, green, and blue. The eyes of persons having this defect of vision have been carefully examined after death without the discovery of any peculiarity. Color blindness therefore has its seat in the sensorium, not in the visual apparatus. The Hering theory is that the retina contains three pairs of visual materials—white-black, red-green, and blue-yellow. Color blindness is accounted for by the supposed absence of one or two of these substances. According to the Young-Helmholtz theory there are three primary color perceptions—for red, green, and violet. In the absence of one of these a color appears composed of the others. The most common forms of color blindness are red blindness, green blindness, and red-green blindness. To detect the defect, the method of having the patient name colors is not satisfactory, because colors may be differentiated by apparent differences of brightness. Professor Holmgren of Upsala, Sweden, devised a series of test wools which furnish the best means of recognizing defects. These are skeins of wool of certain colors ("test colors"), various tints and shades of the same colors, and so-called "confusion colors." When the patient attempts to match the colors with the other skeins, the confusion colors are often added also, and it may be noticed that there is some hesitancy in making the selections. See VISUAL SENSATION — THE COLOR TRIANGLE.

Acquired color blindness may result from disease or accident. It is a symptom of toxic amblyopia brought on by the excessive use of tobacco and alcohol. An important fact in regard to tobacco amblyopia is that the subject may show no signs of color blindness when looking at the objects near at hand, but is unable to distinguish colors at a distance. The Holmgren test would be insufficient in such a case.

The question has received serious legislative attention, and in most of the States of the Union stringent laws have been passed regarding the examination of the vision of all who depend on colors for their guidance. It is a crime in color-blind persons to pursue any calling when their defect, known to them, is liable to injure others, and it might be added that it is foolish for a color-blind painter, tailor, or milliner to attempt to compete with those who have perfect vision.

The safety of the traveling public depends in large measure upon the accuracy with which green or red signals are observed by employees of railways and ships. The colors selected for signals by transportation companies are unfortunately those which are most usually confused by the color blind—red and green. In Sweden, since 1877, only men with normal color vision have been employed in the railway service. In Holland the government controls the matter efficiently. In Italy, while there is no special law, the employees are tested. In France, in the absence of law about examination, Holmgren's test is usually employed. In Germany examination of color sense is prescribed by law. In Austria, on the state railroads, examination is made. In England there is no government regulation, the tests employed by certain companies being considered sufficient. In the United States examination for color blindness among the employees of transportation companies is general, in connection with tests for visual acuity, hearing, and other physical examinations. In some states the tests are required by law, in others, as in New York, the railroad commissioners formulate regulations. Visual tests were first begun in 1880 by Dr. William Thomson, among the employees of the Pennsylvania Railroad. In 1887 the same tests were adopted by the Philadelphia and Reading Railroad. The New York Central instituted color tests about 1890; and by 1902 the majority of the 128 railroads included in the American Railroad Association had adopted some form of color tests. Since that time the practice has become practically universal.

Chromatopsia is a condition in which objects appear tinted with certain colors. The phenomenon is common after cataract operation and may be caused temporarily by certain drugs. Large doses of santonin, e.g., often cause objects to assume a yellow tinge.

Consult: Holmgren, *De la cécité des couleurs* (Sweden, 1877); Edridge-Green, *Color Blindness* (1911); Posey and Spiller, *The Eye and the Nervous System* (Philadelphia, 1906); and Thomson and Weiland, "Detection of Color Blindness," in Norris and Oliver's *System of Diseases of the Eye*, vol. ii (Philadelphia, 1897).

COLORED FIRE. See PYROTECHNY.

COLORED HEARING, or CHROMÆSTHESIA. The anomalous association of colors with sounds. It is the commonest type of synæsthesia, or the formation of unusual connections between sensations of different sense departments. While colored hearing is relatively frequent (statistics record one person in eight), it is exhibited in very varied forms. These may, however, be grouped, in the first place, with regard to the nature and intensity of the photism (the color which is induced), and, secondly, with regard to the nature of the inducing sound. The induced color may in rare cases be of hallucinatory intensity, so as to be seen objectively when the eyes are open. Usually the intensity is less—the photism is localized (Flournoy), though not projected. In the third grade the photism is "imagined"—the color is really present as a visual sensation, but has no definite place; e.g., all soprano voices may be white, all tenor voices green. Fourthly, photisms may be simply "thought," no visual sensation being present. Finally, certain persons possess "negative photisms"—they cannot say what color a sound has, but can say what colors it "ought not" to have. Any auditory impression may serve as the inducing agency. The sources may, therefore, be grouped, for convenience, as (1) musical tones and noises (subdivided into single notes, chords and discords, musical selections, etc., each with further arrangement according to pitch, intensity, clang tint of instrument), and (2) articulate speech (vowels, consonants, words, sentences).

Can we find any uniform relation between these two series of variables, the inducing sound and the induced color? Certain investigators, using the questionary method, have answered in the affirmative. Thus, Bleuler and Lehmann say that "sharply demarcated, small, bright, or pointed photisms are aroused by high-pitched sounds. Red, yellow, and brown are frequent colors; violet and green are rare; blue stands midway in frequency. The tendency to secondary sensations (synæsthesia) is inheritable." Other investigators, who have made detailed experimental studies of a few individuals, contend that the questionary method is inadequate

and that there is a considerable degree of variation, not only between individuals, but also for the same individual at different times, so that "generalization is at present to be avoided."

Numerous theories in explanation of colored hearing have been proposed, though no one of them is entirely satisfactory. The evidence seems, however, to favor a theory which regards the colored "image" as belonging to the domain of sensation rather than to that of the image proper. An adequate explanation, therefore, must be sought in some unusual condition of the brain, and not, as has frequently been suggested, in the association of ideas. The absence of abnormality is attested by the facts that colored hearing is no more frequent among neurotic than among normal individuals and that the associations do not interfere with mental operations. They may, indeed, furnish positive sources of pleasure to their possessor. See SYNÆSTHESIA.

Consult: Bleuler and Lehmann, *Zwangsmässige Lichtempfindungen durch Schall* (Leipzig, 1881); Flournoy, *Les phénomènes de synopsie* (Paris, 1893); G. M. Whipple, *American Journal of Psychology*, vol. vi (Worcester, 1900); Gruber, *L'Audition colorée et les phénomènes similaires* (Paris, 1892); Titchener, *Text-Book of Psychology* (New York, 1910).

COLORED METHODIST EPISCOPAL CHURCH OF AMERICA. See METHODISM.

COLOR GUARD. A military escort for national and regimental colors. (See COLORS.) Formerly a position of great honor and considerable danger when on active service; now used only on regimental parades, reviews, and inspections. The United States Infantry Drill Regulations define the composition of a color guard as "two color sergeants, who are the color bearers, and two experienced soldiers, selected by the colonel."

The colors (national and regimental) are kept at the office or quarters of the colonel, unless required on parade, in which case they are escorted by the color guard, marching in one rank, the color bearers in the centre.

COLOR PHOTOGRAPHY. The reproduction by photography of natural objects in their own colors. There is no means known at present by which, using ordinary photographic processes, this is possible. When a photograph is taken with a camera and a sensitive plate, the developed negative shows an image of the object in various shades of gray, which depend upon the sensitiveness of the photographic plate to the ether waves characteristic of the colors of the natural object. It is possible so to stain a photographic plate that it is more or less sensitive to all colors; but the developed negative is always gray, except possibly for certain accidental colors which have not the faintest connection with those of the object photographed. To reproduce the colors, therefore, other methods are essential, and there are at the present time two quite distinct processes.

One of these is based upon the work and a suggestion of Prof. J. Clerk Maxwell (1831–79), of the University of Cambridge. He showed that if there were produced simultaneously in the normal eye three sensations—viz., definite shades of blue, green, and red—the eye could be made to perceive any desired color of the spectrum by properly adjusting the intensities of these three component sensations. Thus, if by any means—e.g., by sets of mirrors—the eye can be made to see at one time three ordinary photographs of any natural object, looking at one through a piece of red glass, another through a piece of green glass, and a third through a piece of blue glass, the eye will see the object in its natural colors, *provided the intensity of the deposit of silver on the original three negatives is so adjusted for each negative that the intensities of these red, green, and blue sensations are exactly such as to produce the proper color sensations.* To secure this intensity on the photographic plates, three photographs of the object must be taken, each through such a colored screen as will transmit enough light of all wave lengths to produce the desired result on the plate. Thus, one plate is exposed in a camera in front of which is a screen which allows to pass a great deal of red and small amounts of yellow and green; the second is exposed with a screen which is transparent to the green and slightly to yellow and blue; the third is exposed with a screen which is transparent to blue and slightly to green and violet. It is a question of the most careful experimenting to find what photographic plates should be used, and what colored screens give the proper intensity with them.

There are several processes of color photography based upon this general idea. In the process due to F. E. Ives, the three photographs of identical sizes are taken simultaneously on three plates, each through its proper "taking" screen. From these three negatives three positives are made by contact; and these positives, each with its proper "viewing" screen of pure red, green, or blue, placed in a so-called "kromskop" in such a manner that sunlight is reflected through them and their screens, and all three pictures are seen superimposed apparently on each other. In another process invented independently by Professor Joly, of Dublin, and Mr. McDonough, of Chicago, the three colored screens through which the photographs are taken are combined by having a series of lines of these three compound colors ruled very closely together on a piece of glass, every fourth line having the same color. A single photograph is taken through this composite screen; a positive is taken of this, and a viewing screen, consisting of a series of lines—one a pure red, the next pure green, the next pure blue—with the same spacing as in the taking screen, is superimposed on the positive, so that the colored lines come in exactly the proper positions; and this compound plate is used as a transparency by holding it up to the light, or by looking through it at a piece of white paper which is brightly illuminated.

Quite a different process, although of the same general principle, has been invented by Professor Wood, of Johns Hopkins University. It depends for the production of the pure colors, red, green, and blue, upon the phenomena of diffraction gratings (q.v.), by means of which white light may be dispersed into pure colors. (For details concerning this process, consult the references given at the end of this article.)

The most prominent modern system of color photography is that based upon the use of the autochrome plate, which has been perfected by Lumière Frères. The principle underlying the production of this plate is briefly as follows: upon a piece of clear glass numberless starch granules are caused to lie side by side, some of the granules having been dyed red, others green,

and the remainder blue. By filling in the interstices between the granules with opaque material the light transmitted by the plate comes through a single layer of dyed starch granules which have been so thoroughly mixed that the plate has a grayish appearance. Upon this minute mosaic there is flowed a photographic emulsion sensitive to the entire visible spectrum. The plate is exposed in an ordinary camera, the glass side of the plate being towards the lens. To make clear the behavior of the plate, let it be assumed that a red blossom is being photographed. The red light in the image of this blossom will have to pass through the starch granules before reaching the sensitive emulsion and, as only the red granules will transmit this light, the emulsion is acted upon only at the spots underlying red granules. The plate is next developed and then "reversed," i.e., portions which had developed out black are made transparent and vice versa. Since, now, the spots under the red granules alone have become transparent and since only those lying within the extent of the image have been affected, a beautiful colored image of the blossom is seen as the plate is viewed in transmitted light.

In contrast to Ives's process, the above suffers from the defect that the "taking" and the "viewing" screens, i.e., the starch granules, must necessarily be the same. While this circumstance brings about a loss of fidelity in the reproduction of certain spectral colors, the method is nevertheless capable of yielding very beautiful results, even in the hands of amateurs.

An entirely different physical principle is made use of in the Lippmann method of color photography; it depends upon the fact that the colors seen by the eye are caused by ether waves of different wave number; and so, under proper precautions, it is possible to have "stationary vibrations," so called, produced. If one vibrates rapidly the end of a long rope, the other end of which is fastened to a wall, waves are sent along the rope; reflected waves are produced; and, as the direct and reflected waves are thus superimposed, there are certain points, regularly spaced, where the two waves neutralize each other's action, while in between these "nodal" points the string vibrates exactly as if it were an ordinary string stretched between two fixed pegs. This is called a stationary vibration; and the distance between two nodal points equals half the wave length of the train of waves which is the original cause of the vibration. The same phenomenon may be produced by ether waves if allowed to fall upon a mirror. In Lippmann's process a photographic plate of particularly fine grain is placed so as to form one side of a bath containing mercury, the film side being in contact with the mercury. If light of a definite color falls upon the photographic plate, the waves enter the film, reach the mercury, are reflected, and form stationary vibrations. In between the nodes there will be chemical action, which is thus confined to plane surfaces, parallel to each other and very close together, their distance apart depending upon the wave number of the light. If this photographic plate is now suitably developed, the nodal planes will be dissolved out largely, thus forming of the film a pile of parallel plates at minute intervals. If such a pile of plates is viewed with white light, it will appear to be of the same color as that of the light which produces the chemical action, owing to the phenomena of interference (q.v.). Similarly, if the colored light from any natural object falls upon the film in its original condition, each color will produce its own stationary vibration and its own set of parallel planes, where there is chemical action; and so, when developed and viewed in white light, the image will have the proper colors of the object itself. (The above explanation of the Lippmann process is not complete; it offers but a rough idea as to what takes place. In fact, a satisfactory explanation of all the phenomena is not known.) Recent work of H. E. Ives has shown that if a slow, clean working developer be used, and if the developed plate be bleached with mercuric oxide, films containing hundreds of laminæ may be produced. These laminæ impart to the film so high a resolving power that spectral colors of great purity are reflected back when white light is incident upon the plate.

To print in the natural colors the photograph of any colored object is perfectly possible by a simple modification of the method of Ives or of Joly-McDonough, which will be found discussed under THREE-COLOR PROCESS. For additional information, see: Wood, *Philosophical Magazine*, vol. xlvii (London, 1899); Joly, *Nature*, vol. liii (ib., 1895–96); Lippmann, *Proc. Royal Society of London*, vol. lx (ib., 1896); Wiener, *Smithsonian Report* (Washington, 1896); Bolas, Tallent, and Senior, *A Handbook of Photography in Colors* (New York, 1900); Donath, *Die Grundlagen der Farbenphotographie* (Brunswick, 1906); R. Child Bayley, "The Autochrome Plate," in *Scientific American*, vol. xcvii, pp. 42–43 (1907); J. H. Powrie, *Photographic Journal*, vol. xlviii, pp. 3–9 (1908).

COLOR PRINTING. See THREE-COLOR PROCESS; LITHOGRAPHY.

COLORS, MILITARY AND NAVAL. The term applied to the national flag or ensign wherever it is displayed and also to other flags, banners, or guidons carried by military bodies and usually indicating their designation. Emblems, banners, or similar devices have been in use among soldiers and sailors from remotest antiquity. They have been conspicuous in the past for their great moral as well as practical value to the troops carrying them. The older and more historic the colors, the greater their moral value; for the soldiers of succeeding generations would vie with each other in maintaining their traditions and adding to their glory, with the result that many of the greatest exploits of military valor have been born of this desire. In practice they were the rallying point of the organization, the embodiment of its history, and the material symbol of headquarters. They have been in use in battle in every army and in every age. In modern armies the colors are still carried in campaign, but not on the firing line as formerly. An exception to this rule is found in British regiments, which, ever since the battle of Isandhlwana (1879), never imperil the colors when engaged in savage warfare. They still retain their historic and moral value. With the British infantry, colors were originally known as *ensigns* (q.v.), each company carrying its own color. This soon gave way to the system at present in use, whereby each regiment or battalion is supplied with a royal or King's color and a regimental color. The former is a *Union Jack* and the latter a flag of the same color as the facings (q.v.) of the regiment, with the blue union in the corner and the title,

number, and honors of the regiment embroidered upon its folds. Both colors are made of silk, measure about 3 feet 9 inches by 3 feet, and are each mounted on a pole of about 8½ feet in length. Cavalry regiments of the Guard carry oblong *standards*, and dragoon regiments, *guidons*. Both types are made of crimson silk. The Royal Artillery, Royal Engineers, Lancers, Hussars, and Rifle regiments do not carry colors. Since the Zulu War of 1880 British troops no longer take their colors with them when on active service.

In the British military service at the public mounting of garrison guards an elaborate ceremony of considerable antiquity, known as *Trooping the Colors*, is often observed. The origin of this custom goes far back and is said to be uncertain, but it is one of the most impressive ceremonies in the formal routine of the British army. The colors, after being received by an officer, are carried under the escort of the color guard from the left to their position at the right of line between ranks of troops. In the military service of other countries various formalities attach to receiving the colors and having the color guard take their appointed positions in ranks while the assembled regiment presents arms, but in no service is the ceremony as elaborate as in the British army. See ENSIGN.

The colors carried in the United States army by the various regiments and battalions are two in number, the national flag (see FLAG) and the regimental color, both of which are of prescribed size and form for the various arms of the service. The flags of mounted regiments are called *standards;* those of dismounted or foot troops, *colors*. The battalions of engineers carry the national flag, with the title of the battalion embroidered in silver on the centre stripe; and the battalion color, of scarlet silk having in the centre a castle, with the number of the battalion placed above the castle, and the words "U. S. Engineers" below. The coast artillery corps have similar colors, on which the corps device of two crossed cannon are emblazoned. Infantry regiments have the same national color as artillery and engineers; the regimental color being of blue silk, the coat of arms of the United States embroidered in silk on the centre, beneath the eagle, a red scroll with number and name of regiment embroidered in white; cavalry standards in size are somewhat smaller than those carried by the infantry and consist of a national flag made of silk. The regimental standard is of yellow silk, with the coat of arms of the United States embroidered in silk on the centre, beneath the eagle a red scroll, with number and name of regiment embroidered in yellow, fringe yellow. The national standard for field artillery regiments is as prescribed for cavalry. The regimental standard, of the same size, is of scarlet silk embroidered as for cavalry except that the number and name of the regiment is in scarlet on a yellow scroll.

According to the *United States Army Regulations* (1913, par. 232) the national and regimental colors and standards will be carried in battle (usually with the main body or reserve), campaign, and on all occasions of ceremony in which two or more companies participate. At other ceremonies it is carried only when specially ordered. The names of battles in which one or more companies of a regiment, or of the battalions of engineers, or of the artillery corps, have borne a meritorious part are engraved upon silver rings fastened on the pikes or lances of the colors. Each troop of cavalry, battery of field artillery, mounted section of engineers, and mounted company of the signal corps, has a guidon (q.v.) on which the numbers or letters designating the command are inscribed. Camp colors are small flags used to mark the location of some particular headquarters or organization.

In naval usage colors play an equally important part. On board old-fashioned ships they are flown at the peak of the spanker gaff, but on recent ships a special flagstaff fitting in sockets at the stern is used for the colors. In port they are hoisted at 8 A.M. and kept hoisted until sunset. On board ships of the United States navy, when the colors are hoisted, they are saluted by a call on the bugle, or the band, if there is one on board, plays the "Star-Spangled Banner." While the colors are going up and the bugle or band is playing, all officers and men on the upper deck face aft and salute as the colors reach the head of the staff. Dipping the colors (i.e., lowering them a short distance and then hoisting them again) is a species of compliment or salute, but United States naval vessels are forbidden to dip their colors except in returning such a salute. Colors are half-masted to express mourning and hauled down to indicate surrender or submission. When colors are carried in a funeral procession, they are draped with black crape. See BUGLE AND TRUMPET CALLS.

COLOR SERGEANT, sär'jent *or* sĕr'-. In the United States army, a noncommissioned officer of the rank of sergeant detailed for the color guard (q.v.). Two sergeants are detailed for each color guard. The senior carries the national, the junior the regimental color. In the British army he is the equivalent, in rank, of the United States army first sergeant, but formerly was one of the noncommissioned officers constituting the color guard, from which fact the present title is derived.

COLORS OF ANIMALS. See EVOLUTION.

COLORS OF THIN PLATES. See LIGHT, *Interference and Diffraction.*

COLOR SYMBOLISM OF THE AMERICAN INDIANS. The Navaho, Osage, Winnebago, Hopi, Arapaho, Sioux, Zuñi, and no doubt many other tribes employed colors to symbolize various religious and mystic concepts. The Sioux and several other Plains tribes used colors to symbolize deeds in a system of heraldry. Each tribe, however, had its own way of associating the colors, so that no general statement of details can be made. Consult *Handbook of American Indians* (Washington, 1907).

COLOS'SÆ (Lat., from Gk. Κολοσσαί, *Kolossai*, also spelled Κολασσαί, *Kolassai*). An ancient city of Phrygia in Asia Minor, situated on the south bank of the Lycus River, where it enters a deep gorge through the ridge that divides the upper from the lower Lycus valley, some distance below which it joins the Mænander. Colossæ was at one time the most important city of southwestern Phrygia, lying on the trade route from Sardis to the south and east. Like its near neighbors, Laodicea and Hierapolis, it probably carried on an extensive trade in the dyed woolen goods for which the region was famed. Unlike Hierapolis, however, it was without natural advantages and was finally outrivaled by the trade of Laodicea. In Roman times the town had lost a considerable share of its former importance. In Byzantine times it

largely retrieved its fortunes and was protected by a fortress built at Chonæ, the modern *Khonas*, on a spur of Mount Cadmus, 3 miles southeast of the city. In the later centuries the population of the city gathered around the fortress, leaving the city finally to disappear. Christianity made its way to Colossæ in the days of Paul, not through his personal visitation (cf. Col. ii. 1), but through evangelistic work directed during his long sojourn at Ephesus (cf. Acts xix. 10), and carried on probably by Epaphras in the general region of the Lycus valley (cf. Col. iv. 12, 13). During his first imprisonment at Rome Paul sent to the city two letters—one addressed to the church and the other to Philemon, an individual belonging to the church. Through the Phrygian element in the membership the church was more or less infested with a mysticism derived from the native religious (cf. Col. ii. 1–19). Consult Ramsay, *Cities and Bishropics of Phrygia*, vol. i (1895). See COLOSSIANS; PHILEMON.

COL'OSSE'UM. See AMPHITHEATRE.

COLOSSIANS, kō-lŏsh'ĭ-*anz or* kō-lŏsh'*anz*, EPISTLE TO THE. In the oldest Greek manuscripts the title is simply *πρὸς* Κολοσσαεῖς, 'to the Colossians.' One of Paul's Epistles, addressed to the Christians at Colossæ (q.v.).

This letter, and those sent to the Ephesians and Philemon, make a closely connected group of three writings of the Apostle, addressed to the same general region and written about the same time, probably at Rome during Paul's imprisonment mentioned in Acts xxviii. With Philemon it is connected by an identity of personal references, cf. iv. 9 and Philem. verse 10; iv. 12 and Philem. verse 23; iv. 17 and Philem. verse 2; to Ephesians it is bound by a significant community of contents.

The general outline of the Epistle is as follows: After an *introductory* section (i. 1–13) the Apostle passes almost imperceptibly to an extended statement of the *nature* and *work of Christ* (i. 14–ii. 3). Then he discusses and warns against the *false teachings* by which the church at Colossæ was threatened (ii. 4–23). This is followed by a *hortatory* section, in which the church is urged to live up to the doctrine of the faith (iii. 1–iv. 6), after which *personal* matters, salutations, etc., close the letter (iv. 7–18).

The Pauline authorship of Colossians has been vigorously assailed by such individual critics as Mayerhoff (1838) and Holtzmann (1872), and by such schools as that of Tübingen (1845)—the critics holding that it gives proof of a literary imitation of other writings (Ephesians) which prevents it from being considered genuinely Paul's; the school claiming that it betrays such a presence of second-century Gnostic ideas as to make it necessary to assign it to that post-Pauline age. Neither of these contentions is accepted as valid by the best scholars of the present time. As a matter of fact, assuming, as a working hypothesis, the claim involved in the Epistle's greeting that it was written by Paul, the document shows itself throughout so consistent with the claim as to make it critically impossible to deny its validity.

Within the circle of those who accept its Paulinity, however, the chief question among critics to-day concerns the nature of the errors opposed by the Apostle. From a careful study of the Epistle the following facts are apparent: 1. The errors had not developed to such an extent as to cause separation from the Church (the phrase in ii. 19 "not holding fast to the Head" could hardly be said of full separatists). 2. The teachers were Jews, and Jews of a Judaistic type (the references to circumcision in ii. 11 and to the ordinances of the law in ii. 14 show that Paul was opposing propagandists of a Jewish legalistic character). 3. At the same time they went beyond this type (see the mention of "drink" in the warning of ii. 16, an element which did not enter into the restrictions of the Judaizers; see also the designation of their position as being "according to the traditions of men" (ii. 8), and "according to the precepts and teachings of men" (ii. 22), which would not have been a natural way for Paul to designate the Judaistic position that rested on the authority of the Old Testament law; notice also the absence of all antithesis between faith and works and of any insistence on legalism as necessary to salvation, which were characteristics of the Judaistic propaganda). 4. Further, there are passages which might seem to indicate that these teachers were under the influence of Essenism, though they do not show them to have been Essenes (e.g., ii. 20–23, which describes their regulations as an ascetic severity towards the body—*ἀφειδία*—though asceticism is evidently not represented as practiced as an end in itself, as it was with the Essenes; ii. 18, which shows them to have been given to angel worship, a cult which was perhaps more consonant with Essenism than with the practice of Judaizers, though this worship was also apparently accompanied by visions which were foreign to Essenism). 5. There are passages which seem to indicate the presence of Gnostic elements in these errors (e.g., ii. 2–9, which give us characteristic Gnostic terms such as "the *mystery* of God," "all the *fullness* of the Godhead," also ii. 10, which discloses the distinctive Gnostic idea of a graded series of supernatural beings, conceived of as emanations from God—"who is the head of all principalities and powers." This idea is repeated in verse 15—"having despoiled the principalities and powers"—and appears in various forms in the long passage i. 15–20, e.g., "the first-born of all creation"—"in Him were all things created, in the heavens and upon the earth, things visible and things invisible, whether thrones or dominions or principalities or powers"—"He is the head of the body, the Church, who is the beginning, the first-born from the dead," which latter passage, together with ii. 9–11, 15, 19, shows the significant emphasis placed by the Apostle upon the supremacy of Christ in both the physical and the spiritual worlds, and the absolute essentiality of union with Him in order to foster spiritual life and well-being. Such a full recognition of the supreme and sole mediatorship of Christ would serve to combat the Gnostic tendency to subordinate Him to the category of these angelic emanations, which seems to have been one of the most serious of the false teachings). 6. These errors, moreover, while vague and indeterminate, appear to have been set forth as mutually related, and to have been promulgated in a very dogmatic way (cf. ii. 4, 8, 18), being held forth as a mystery known only to the initiated (cf. Paul's counterassertion in ii. 2–3; iii. 3).

It would thus seem that these errors constituted a teaching of a more or less systematic kind, in which the underlying speculative principles were brought to bear upon the rule and

habit of life; that it was something more than mere Judaism, even Judaistic Judaism; that, in its main features, it was due to an attitude of mind somewhat similar to that which produced Essenism, and that it also possessed elements which appear in a more fully developed form in the Gnosticism of the second century. The great difficulty is in historically locating such a combination as is here presented to us.

In the effort to solve this problem it is to be remembered: (1) that, while these errors constituted a system of teaching, the system was not a fully developed one—at least Paul does not so treat it; (2) that Gnosticism was, in reality, an attempt to assimilate Christianity and philosophy, and that its philosophic element was a mystical rather than a logical one, so that we should be prepared to find the place of its beginnings in the East rather than the West; (3) that this attempt at assimilation was made on the principle of eclecticism, Gnosticism being, in fact, a combination of Jewish, Pagan, and Christian elements, the Jewish element being furnished by such types of thought as are seen in the Apocalyptic literature (e.g., in the Book of Enoch with its extensive angelology), and in certain of the doctrines of the Essenes, the Pagan by Hellenic philosophy and Oriental theosophy, the Christian by the evangelistic preaching; (4) that, as these Jewish speculative tendencies came in contact with Eastern speculation, they fermented, and this fermentation, going on within the Christian Church and in contact with Christianity, gave rise to Gnosticism.

Inasmuch, therefore, as this Epistle was sent to a church of the East, in the region where and at the time when the thoughtful Jew and the philosophic Greek and the theosophic Oriental were coming together—especially to this region of Phrygia, the home of one of the most mystical of the Pagan cults, that of Attis and Cybele, and whose Jewish population had been originally imported out of Babylon, from which place they may have brought with them an Oriental habit of Jewish thought—it would seem as though we had in these Colossian errors a specimen of just that process of fermentation which produced the beginnings of Gnosticism.

The attempt of Harnack and others to consider the Apostle as referring to parish difficulties of a purely practical nature, devoid of all speculative elements, results from a superficial exegesis which does not take the Epistle seriously.

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COLOSSOCHELYS, kō-lŏs'sō-kē'lĭs (Neo-Lat., from Gk. κολοσσός, *kolossos*, colossus + χέλυς, *chelys*, tortoise). A gigantic fossil turtle found in the Pliocene deposits of India. See TURTLE.

COLOS'SUS (Lat., from Gk. Κολοσσός, *Kolossos*). A rare Greek word of unknown origin, used to denote a statue very greatly above the size of life. The English adjective colossal has a wider sense, denoting all statues which exceed the size of life. Innumerable colossi were raised in Egypt, mostly of the hardest stone, many of them 50 to 60 feet in height. Among the most celebrated are the two statues of Amenophis III. (See MEMNON.) It was in Greece that the most famous colossi appeared; e.g., three by Phidias —the bronze statue of Pallas Athene, on the Acropolis of Athens, the plume of whose helmet and the point of whose spear were landmarks to sailors between Sunium and Athens; another statue of the same goddess, of gold and ivory, in the Parthenon at Athens; and the Olympian Zeus, of the same material. Among the seven wonders of the Old World was reckoned the Colossus of Rhodes, representing Helios, the sun god, the national deity of the Rhodians, the work of Chares, of Lindus. It was erected by the Rhodians, at a cost of 300 talents, apparently as a thank offering after the successful defense of the city against Demetrius Poliorcetes. It is said to have been of bronze, cast in separate pieces, and to have occupied the artist 12 years. It was set up about 280 B.C., but 56 years later was overthrown by an earthquake, and lay in ruins until in 653 A.D. the Arabs captured the city and sold the metal to a Jewish merchant. The height was probably about 90 feet. The Hellenistic age seems to have taken delight in colossal statues and groups, and the Romans followed the Greeks. We hear of a statue of Jupiter on the Capitol made from the spoils of the Samnites, of such a size as to be visible from the Alban Hills. More celebrated was a Colossus of Nero, executed in marble, 110 or 120 feet high, from which the neighboring amphitheatre is believed to have derived the name of "Colosseum." At the death of Nero the head was changed to that of the sun god. The colossus was subsequently moved by Hadrian to make room for his temple of Venus and finally disappeared during the Middle Ages. Its later pedestal, discovered in 1828, may be seen between the Colosseum and the temple built by Hadrian. In modern times many colossal statues have

been set up. Especially celebrated are the "Bavaria," at Munich, the "Germania," at the Niederwald on the Rhine, the equestrian statue of Peter the Great in St. Petersburg, and the Bartholdi statue of "Liberty Enlightening the World" in New York harbor.

COLOS'TRUM (Lat.). A term applied to the first milk yielded after the birth of the young. It differs materially from ordinary milk in appearance and composition and is ordinarily considered unfit for consumption or manufacture. When examined under the microscope, it is found to contain, in addition to the ordinary fat globules of milk, peculiar aggregations of very minute fat granules, which are known as colostrum corpuscles or colostrum bodies, and which are probably the débris of the cells of the mammary gland. The chief chemical differences between colostrum and milk are a larger percentage of total solids and ash, a much greater proportion of albumin to casein, and less milk sugar. The fat differs somewhat in character from that of normal milk, containing considerable colesterine. Colostrum exerts a purgative effect upon the new-born infant and thus removes the meconium which has accumulated in the fetal intestine. Colostrum disappears as such within a few days after parturition, gradually assuming the characteristics of normal milk.

COL'PEO. A fox dog (*Canis magellanicus*) of Patagonia and Tierra del Fuego, larger, redder, and more wolflike than the other South American species. See FOX DOG.

COLPEPER, THOMAS. See CULPEPER, THOMAS.

COL'PORTAGE (from Fr. *colporter*, to carry on one's neck, from *col*, Lat. *collum*, neck + *porter*, Lat. *portare*, to carry). The distribution of religious publications, books, tracts, etc., by carriers called *colporteurs*.

COLQUHOUN, kō-hōōn', ARCHIBALD ROSS (1848–1914). An English traveler. He became associated with the Indian Department of Public Works in 1871. After acting as secretary of the British Commission to Siam, he in 1881–82 and 1883–84 made extensive tours of exploration in order to find a route for a railway between India and China. He became Administrator of Mashonaland in 1890, and in 1895 visited Central America as a representative of the Panama and Nicaragua canal projects. His travels are related in the various books he wrote, which include: *Across Chrysé* (2 vols., 1883); *The Opening of China* (1884); *English Policy in the Far East* (1885); *The Key of the Pacific* (1895); *China in Transformation* (1898); *Overland to China* (1901); *Greater America* (1904); *Mastery of the Pacific* (1904); *The Africander Land* (1906); *The Whirlpool of Europe; Austria-Hungary and the Hapsburgs* (with Mrs. Colquhoun, 1907); *From Dan to Beersheba—Reminiscences of Public Service* (1908); *Germany and Sea Power* (1909); *China in Reformation* (1912).

COLQUHOUN, JOHN (1805–85). A Scottish writer on sport. He was born at Edinburgh and was educated at the university in that city. In 1840 he recorded his manifold adventures as a sportsman in the extremely interesting and popular volume entitled *The Moor and the Loch*, with an autobiographical preface (4th ed., 1878). He is also author of: *Rocks and Rivers* (1849); *Salmon Casts and Stray Shots* (1858); *Sporting Days* (1866).

COLQUHOUN, PATRICK (1745–1820). An English police magistrate and writer, known for his efforts in behalf of administrative reform and the amelioration of the condition of the poor. He was born at Dumbarton and at an early age went to Virginia, where he became a successful merchant. Returning to Glasgow in 1766, he became a leader in public affairs, and in 1782 founded the Glasgow Chamber of Commerce, the oldest institution of its kind in Great Britain. He removed to London in 1789 and published there in 1795 his famous *Treatise on the Police of the Metropolis*, in which he advocated a complete reform of the police system of that city. Several of the recommendations made by him in the work, which passed through seven editions, were subsequently adopted. In consequence of the numerous important municipal reforms introduced by him, he was appointed magistrate at Westminster, London, in 1798. He published other treatises, including: *System of Education for the Laboring People* (1806); *On Indigence* (1806); *On the Population, Wealth, Power, and Resources of the British Empire* (1814; 2d ed., 1815).

COLQUHOUN, SIR PATRICK, or MAC CHOMBAICH DE (1815–91). An English lawyer. He was a great-grandson of Patrick Colquhoun (q.v.) and was educated at Westminster, Cambridge, and Heidelberg. While at Cambridge he became an expert oarsman, and in 1837 he won the Wingfield sculls, making him the amateur champion of England. He was for many years a member of the British diplomatic service, more particularly in Saxony, where he was Councilor of Legation until 1866. He also held the position of Chief Justice of the Supreme Court of the Ionian Islands while these were under British rule (1861–64). His principal work is a *Summary of the Roman Civil Law* (4 vols., 1849–54).

COL'QUITT, ALFRED HOLT (1824–94). An American soldier and politician, the son of Walter T. Colquitt (q.v.). He was born in Walton Co., Ga., graduated at Princeton in 1844, and was admitted to the bar in the following year. He volunteered for service in the United States army at the beginning of the Mexican War; was soon afterward appointed major, and served as an aid to General Taylor at the battle of Buena Vista. From 1853 to 1855 he was a prominent Democratic member of Congress, but at the expiration of his term declined a renomination; he was a member of the Georgia Legislature in 1859. On the approach of the Civil War he became an active secessionist and was a prominent member of the Georgia secession convention in 1861. He enlisted in the Confederate army early in 1861; quickly rose from the rank of captain to that of major general; was engaged in most of the operations in Virginia; distinguished himself at Antietam and Petersburg, and was engaged at the battle of Olustee, Fla., and the defense of Fort Fisher. After the war he was Governor of Georgia from 1876 to 1882 and was a member of the United States Senate from 1882 until his death.

COLQUITT, WALTER T. (1799–1855). An American lawyer and politician, born in Halifax Co., Va. He studied at Princeton, read law at Milledgeville, Ga., was called to the bar in 1820, and practiced with great success, first at Sparta and later at Columbus. He was circuit judge from 1826 to 1832. In 1834 and 1837 he was a member of the State Senate of Georgia, and from 1839 until his resignation in 1840 occupied a seat in the Federal House of Representatives. In 1842–43 he was again in Congress

and from 1843 until his resignation in 1848 was a United States Senator. He was originally a States-rights Whig, but became a Van Buren Democrat. During the Mexican War he was strongly opposed to the Wilmot Proviso (q.v.).

COLT, kōlt, LE BARON BRADFORD (1846–). An American jurist and legislator, born in Dedham, Mass. In 1868 he graduated from Yale College and in 1870 from the Columbia Law School. He spent a year in European travel, practiced law in Chicago and in Providence, R. I., and was a member of the General Assembly of Rhode Island from 1879 to 1881. In the latter year he was appointed United States district judge for Rhode Island by President Garfield, and three years later, by President Arthur, United States circuit judge for the first judicial circuit. He held this office until Jan. 21, 1913, when he was elected United States Senator for the term expiring 1919.

COLT, kōlt, SAMUEL (1814–62). An American manufacturer, inventor of the revolver. He was born in Hartford, Conn., where he worked in his father's factory. Obtaining a knowledge of chemistry, he lectured on that subject in the United States and Canada, and in 1835 secured patents for a revolving pistol, a wooden model of which he had made while at sea when a boy. In the same year the Patent Arms Company was formed for the manufacture of his invention, but became insolvent in 1842 through insufficient demand for its product. In 1847 Colt contracted to make 1000 weapons for General Taylor, and the improvement of the revolver, together with the increased demand for it, set the business on a stable footing, while new improvements were constantly made in the weapon. In 1852 he built a large armory in Hartford, where, besides firearms, machinery was made for their manufacture in other places, notably at the English and the Russian arsenals. He invented a battery for submarine harbor defense, and in 1843 laid and successfully tested in New York harbor the first submarine telegraph cable. His line was insulated with a combination of cotton yarn, beeswax, and asphaltum, incased in a lead pipe, gutta-percha not then having been discovered.

COLTMAN, ROBERT, JR. (1862–). An American physician, born in Washington. He received his professional training at Jefferson Medical College, Philadelphia, and in 1881 began the practice of medicine. In 1896 he was appointed professor of anatomy at the Tung Wen College, Peking, and in 1898 professor of surgery at the Imperial University, Peking. During the siege of Peking by the Boxers in 1900 he sent out the first message that reached the outside world, acting as correspondent for the *Chicago Record*. He became attorney for the Standard Oil Company at Tientsin, China. He is author of *The Chinese, their Present and Future: Medical, Political and Social* (1891) and *Yellow Crime, or Beleaguered in Peking* (1901).

COLTON, kōl'ton. A city in San Bernardino Co., Cal., 58 miles east of Los Angeles, on the Atchison, Topeka, and Santa Fe, the Southern Pacific, and the San Pedro, Los Angeles, and Salt Lake railroads (Map: California, H 8). It is an important shipping centre for fruit and vegetables, has railroad-car shops, large precooling plants, canneries and packing houses, cement works, flour mills, and fertilizer plants. The water works and electric-light plant are owned by the city. Pop., 1900, 1285; 1910, 3980.

COLTON, ARTHUR (WILLIS) (1868–). An American writer of stories, born at Washington, Conn. He was educated at Yale University (A.B., 1890; Ph.D., 1893) and was instructor in English there in 1893–95. In 1906 he became librarian of the University Club, New York City. Besides his contributions to *Harper's*, *Scribner's*, *Collier's*, and the *Atlantic Monthly*, he is author of *Bennie Ben Cree* (1900); *The Delectable Mountains* (1901); *The Debatable Land* (1901); *Tioba* (1903); *The Belted Seas* (1905); *The Cruise of the Violetta* (1906); *Harps Hung Up in Babylon*, poems (1907).

COLTON, CHARLES HENRY (1848–1915). An American Roman Catholic bishop, born in New York City. He was educated at St. Francis Xavier College and at St. Joseph's Seminary, Troy, N. Y. Ordained a priest, he was assistant (1876–86) and pastor (1886–1903) at St. Stephen's Church, New York City. After 1896 he was also chancellor of the archdiocese of New York until 1903, when he was consecrated Bishop of Buffalo. He is author of *Seedlings* (1906); *My Trip to the Holy Land* (1906); *Buds and Blossoms* (1910).

COLTON, GEORGE RADCLIFFE (1865–1916). An American public official, born at Galesburg, Ill. He was educated at Knox College. He was a ranchman in New Mexico in 1881–86, a member of the Nebraska House of Representatives in 1889–90, and a national bank examiner for the District of Nebraska in 1897. As lieutenant colonel of the First Nebraska Volunteer Infantry he went to the Philippine Islands, where he remained, upon the American occupation, to organize the Manila customs service. In 1905 he undertook a similar task in Santo Domingo. He was insular collector of customs in the Philippines from 1907 to 1909, and then became Governor of Porto Rico. The new tariff bill for the Philippines, enacted by Congress in 1909, was drafted by him.

COLTON, kōl'ton, WALTER (1797–1851). An American writer. He was born in Rutland, Vt., graduated at Yale and Andover, and for several years was professor of moral philosophy and belles-lettres in the Middletown (Connecticut) Academy. In 1831 he became chaplain in the navy. He was made alcalde of Monterey, Cal., in 1845, and founded the *Californian*, the first newspaper published in that State. He also built the first schoolhouse and made the first announcement of the discovery of gold. Colton edited newspapers in Washington, Charlestown, Mass., and Philadelphia, and published *Ship and Shore in Madeira, Lisbon, and the Mediterranean* (1835); *A Visit to Athens and Constantinople* (1836); *Three Years in California* (1850); *Deck and Port* (1850); *The Sea and Sailor* (1851).

COLTS'FOOT'. See TUSSILAGO.

COLU'BRIDÆ (Neo-Lat. nom. pl., from Lat. *coluber*, serpent). The largest and most scattered family or group of snakes. It is variously limited by systematic authors and has served as a residuary group for all serpents not easily classified elsewhere, so that a definition is difficult. The group, however, may be said to include the "common" small, harmless serpents everywhere. The garter snakes, water snakes, hognose, etc., are North American representatives of this family, to which, indeed, all nonvenomous American snakes belong except a few species along the Mexican border.

COLUGO, kō-lōō'gō, or KAGUAN. See COBEGO.

COLUMBA. See CALUMBA.

COLUM'BA, SAINT, SAINT COLUM-CILLE, or SAINT COLM (521–597). An Irish missionary, one of the greatest names in the early ecclesiastical history of the British Isles. He was born at Gartan, County Donegal, northwest Ireland, Dec. 7, 521. His father was Fedhlmidh, of the powerful Clan O'Donnell, and related to several of the rulers of Ireland and west Scotland; his mother was Eithne, who also boasted royal ancestry. He studied first at Moville, County Down, 5 miles south of Bangor, on Belfast Lough, under Bishop St. Finnian, and was ordained deacon by him; next under another St. Finnian, at Clonard, who ordained him a priest. He was early distinguished by his piety, and the name Columba, i.e., 'dove,' was recognized as an appropriate one. He showed rare monastic zeal. In 545 he founded the church and monastery of Derry, and in 553 those of Durrow, not far west of Dublin. The latter became of great importance and in both places the saint is still commemorated by a well and a stone. He founded other monasteries, the chief of which was Kells. In 561 he embroiled himself in the civil strifes of his country and was charged with having incited the bloody battle of Culdreimhne (now Cooladrummon), because he appealed to his tribe to defend by force of arms the copy of the Latin Psalter which he had made from one borrowed of his old teacher, St. Finnian of Moville. Legend says that for this he was required to do penance by foreign missionary labor. In 563 he headed a little company of 12 disciples and sailed across to the west coast of Scotland, and landed upon the little island of Hy, since called I-colum-cille, but better known as Iona. There he began the great work of converting the Picts, to which he owes his fame. His missionary operations were probably very simple, consisting of persistent personal appeals. In the legends which are told about him, as in the life of him by Adamnan and in the *Book of Deer*, a Celtic manuscript of the eleventh or twelfth century, preserved at Cambridge, England, edited by John Stuart for the Spalding Club (Aberdeen, 1869), many miraculous occurrences are narrated. He promoted monasticism, overcame the opposition of the Druids, made many converts, including royal personages, and founded many churches. As in Ireland, so in Scotland, he took part in secular affairs. He died at Iona at midnight between June 8 and 9, 597. With loving care his bones were enshrined, and his relics—the stone pillow on which he slept, the books he loved so well, the staff which was the symbol of his pastoral authority, and other objects which he had used—were long preserved and exhibited. Columba was a poet, and three Latin hymns now extant are attributed to him. In one of them, the "Altus Prosator," published with an English paraphrase, by John, Marquis of Bute (Edinburgh, 1872), each strophe begins with a different letter, in alphabetical order. Besides these, some Celtic poems were attributed to him, and a Rule (printed in Celtic and English in Haddon and Stubbs, *Councils and Ecclesiastical Documents*, vol. ii, p. 119, and in English only in Skene, *Celtic Scotland*, vol. ii. p. 508).

Columba, while he was an ascetic, was an eager student and made copies with his own hand of documents which fell in his way. Two of these—the *Book of Kells* and the *Book of Durrow*—were long preserved. His energy sometimes led him to harsh actions, but that he was tender-hearted the affection of his monks evinces. He seems to have had original ideas upon church government; for Bede writes of Iona that its ruler was "an abbot, who is a priest, to whose direction all the province, and even the bishops, contrary to the usual method, are subject, according to the example of their first teacher [Columba], who was not a bishop, but a priest and a monk" (*Eccles. Hist.*, vol. iii, p. 4). Bede then criticizes the Columban monks because they did not, until 715, keep Easter after the Western manner, but upon the 14th of Nisan, or whatever day it came, as the Eastern church did. Their religious services were numerous, but the rest of their time was spent in labor, either in working upon their fields and tending cattle (for they raised what they needed for their support), or in copying books, particularly the Bible, or in studying or in teaching others. Latin was spoken as well as Celtic and was employed by them in writing. Some of the monastic communities contained famous schools. The continuance of the memory of St. Columba in Scotland is shown by the fact that his is one of the commonest names given to a church, even to-day, among the Presbyterians. The life of St. Columba was written by two of his successors in the abbacy of Iona—Cuimine Ailbhe, seventh abbot (657–669), whose *De Virtutibus Sancti Columbæ* (printed by Pinkerton, London, 1789; Paisley, 1889) was incorporated in the *Vita Sancti Columbæ* of Adamnan, the ninth abbot (679–704). But both these writers are concerned not so much with the life as with the prophecies, miracles, and other unusual phenomena which were ascribed to their subject, and so the amount of real biographical facts is very small. This life by St. Adamnan is, however, one of the best of the mediæval lives of saints. It has been edited in a very superior manner, first by W. Reeves (Dublin, 1857), and again upon Reeves's edition by J. T. Fowler (Latin text and English notes, Oxford, 1894; Eng. trans. of the text, 1895). There is a more recent English translation by Wentworth Huysche (London, 1906). Consult also Chevalier, *Repertoire des sources historiques* (q.v.) (Paris, 1905); Macgregor, *Stories of Three Saints* (New York, 1908); Leahey, *Columbanus, the Celt* (Philadelphia, 1913); Troup, *St. Columba; the Lord's Song in a Strange Land* (London, 1913).

COLUM'BÆ (Lat. nom. pl. of *columba*, dove), or **COLUM'BIFOR'MES.** An order of birds, containing the pigeons (Columbidæ and allied families) and the dodos (Didiidæ). See DODO; DOVE; PIGEON.

COLUM'BAN, or COL'UMBA'NUS, SAINT (543–615). One of the most learned and eloquent of the many missionaries whom Ireland sent to the Continent during the Dark Ages. He was born in Leinster. Having studied under St. Congall, in the great monastery of Bangor, in Ulster, he passed over to France, accompanied by 12 companions (c.585), and in Austrasia and Burgundy, near the southern extremity of the Vosges Mountains, founded the monasteries of Anegray, Luxeuil, and Fontaine. His adherence to the Irish rule for calculating Easter involved him in controversy with the French bishops about 603; and a few years later the courage with which he rebuked the vices of the Burgundian court led to his expulsion from France. Passing through Switzer-

land into Lombardy, he founded, in 612, the famous monastery of Bobbio, in the Apennines, where he died on Nov. 21, 615. The writings of St. Columban, which are wholly in Latin, consist of a rule for the government of his monastery, a few poems, several letters on ecclesiastical affairs, and 16 short sermons. His monastic rule has been printed more than once; but the most complete edition of his works is in Patrick Fleming's *Collectanea Sacra*, published at Augsburg in 1621, and at Louvain in 1667. It is reprinted in Migne, *Patrol. Latina*, lxxx. Of the sermons of St. Columban, M. Guizot remarks that "the flights of imagination, the pious transports, the rigorous application of principles, the warfare declared against all vain or hypocritical compromise, give to the words of the preacher that passionate authority which may not always and surely reform the soul of his hearers, but which dominates over them, and, for some time at least, exercises paramount sway over their conduct and their life." The town of San Colombano, in Lombardy, takes its name from the Irish monk, as the town and Canton of St. Gall (q.v.), in Switzerland, perpetuate the name of the most favored of his disciples. For his life, consult: Jonas, who was almost a contemporary and one of his successors as the abbot of Bobbio, in Migne, *Patrologiæ Cursus Completus* (Paris, 1857–60); Besser (Leipzig, 1857); Zimmermann (St. Gall, 1865); Bispham (New York, 1904); and for other reference works, see Chevalier, *Repertoire des sources historiques* (Paris, 1905).

COL'UMBA'RIUM (Lat., dovecote, from *columba*, dove). From a fancied resemblance to a dovecote, the name given to the rows of niches in the walls of sepulchral chambers in Roman burial places, to receive the little urns or sarcophagi of marble or terra cotta containing the ashes of the deceased; finally, to the sepulchral chamber itself. Tombs of this description were chiefly used by the poorer classes who could not afford separate tombs, and were erected by great families for their slaves and dependents, or by funeral associations or corporations under the Empire. Several perfect examples have been found near Rome; among them, those of the Vigna Codini, at the Licinian Gardens. Others exist at Naples and elsewhere in Italy. The *ustrina*, or places for incinerating the bodies, were attached to the columbaria. In recent times the term "columbarium" has been applied to a room or hall connected with a crematory and provided with niches for the cinerary urns.

COLUM'BA'S, ISLE. The poetic name for the island of Iona, on the western coast of Scotland, where St. Columba, "The Apostle of Caledonia," founded a monastery about 565 and was buried in 597.

COLUM'BIA (Neo-Lat., from *Columbus*). The name under which the United States is usually personified.

COLUMBIA. A name formerly applied to the region, west of the Rocky Mountains, embracing British Columbia and the States of Washington and Oregon.

COLUMBIA. A city and the county seat of Boone Co., Mo., 146 miles by rail west-northwest of St. Louis, on the Wabash and the Missouri, Kansas, and Texas railroads (Map: Missouri, D 3). It is the seat of the University of Missouri (State), opened in 1841; of institutions for women, Christian College (Christian), established in 1851, Bible College, and Stephens College (Baptist), founded in 1856, and two academies. The library of the State Historical Society is in one of the State university buildings. A monument to Thomas Jefferson, originally erected in Monticello, Va., is now set up here. The city contains a United States government weather station and the Parker Memorial Hospital. Columbia has flouring and planing mills, elevators, packing plant, and a shoe factory; also farming, fruit-growing, and stock-raising interests. Settled in 1820, Columbia is governed by a mayor, elected biennially, and a council. The water works and light plant are owned by the city. Pop., 1890, 4000; 1900, 5651; 1910, 9662.

COLUMBIA. A borough in Lancaster Co., Pa., 28 miles southeast of Harrisburg; on the Susquehanna River, here more than a mile wide, and on the Pennsylvania and the Philadelphia and Reading railroads (Map: Pennsylvania, J 7). The borough is situated in one of the most fertile tobacco regions in the country. It is an important industrial centre, its manufactures including boilers and engines, iron, laundry machinery, silk, lace, shirts, wagons, brushes, flour, novelties, malt liquors, stoves, etc. Wrightsville, on the west bank of the river, is connected with the borough by one of the longest bridges in the United States. The place was founded in 1726 by English Quakers from Chester County and was for many years called Wright's Ferry. In 1789 it was proposed to locate the capital of the United States here. In June, 1863, the original bridge was burned to prevent the Confederate troops from marching on Philadelphia. Pop., 1890, 10,199; 1900, 12,316; 1910, 11,454.

COLUMBIA. The capital of South Carolina, and the county seat of Richland County; on the east bank of the Congaree River below the junction of the Broad and Saluda rivers, 82 miles by rail northeast of Augusta, Ga., and 129 miles by rail northwest of Charleston; on the Southern, the Atlantic Coast Line, the Columbia, Newberry, and Laurens, and the Seaboard Air Line railroads (Map: South Carolina, D 3). Columbia is at the head of steam navigation on the river and is on the Columbia Canal, which furnishes abundant water power (13,000 horse power). The city is laid out attractively, with streets well shaded and crossing at right angles. Among the notable buildings are the Capitol, courthouse, city hall, post office, the State insane asylum, and the State penitentiary. The city contains also a municipal hospital, a public library, and the Baptist Church in which the secession ordinance convention was held. The educational institutions include the University of South Carolina, opened in 1805; Presbyterian Theological Seminary; Columbia Female College (Methodist Episcopal, South), opened in 1859; College for Women (Presbyterian), opened in 1890; Lutheran Seminary; Allen University (African Methodist Episcopal), opened in 1881; and Benedict College (Baptist), opened in 1871, for colored students. Columbia has extensive manufacturing interests, principally in cotton and fertilizers; and there are also sash and door factories, iron works, foundries, machine shops, etc. The commission form of government was adopted in May, 1910. Pop., 1900, 21,108; 1910, 26,319; 1914 (est., including suburbs annexed), 60,000.

In response to a demand for a more central place of government than Charleston, the Legislature of South Carolina in 1786 ordered Columbia to be laid out, and in January, 1790, it met there for the first time. On Feb. 17, 1865, General Sherman, at the head of the Union army, entered Columbia, and that night a fire started which lasted an entire day and destroyed three-fifths of the city, including the old statehouse and its library of 25,000 volumes, a convent, several churches, the railroad depot, and much cotton. After the war Columbia rapidly recovered its prosperity.

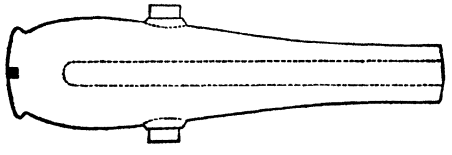
COLUMBIA. A city and the county seat of Maury Co., Tenn., 49 miles by rail south by west of Nashville, on Duck River, and on the Louisville and Nashville, the Nashville, Chattanooga, and St. Louis, and the Nashville, Florence, and Sheffield railroads (Map: Tennessee, D 3). The courthouse, a well-equipped military academy, library, hospital, and the Columbia Institute for young ladies are noteworthy features. Columbia is the centre of a fertile agricultural region and an important grain and live-stock market. It controls large phosphate interests and has cotton, corn, and flouring mills, pump factory, lumber and planing mills, marble works, machine shops, garter factory, etc. Settled in 1811, Columbia was first incorporated in 1822. It is governed under a revised charter of 1903, which provides for a mayor elected every two years and a council elected by wards. Pop., 1890, 5370; 1910, 5574.

COLUMBIA, BRITISH. See BRITISH COLUMBIA.

COLUMBIA, DISTRICT OF. See DISTRICT OF COLUMBIA.

COLUMBIA CITY. A city and the county seat of Whitley Co., Ind., about 100 miles (direct) north-northeast of Indianapolis; on the Vandalia and the Pittsburgh, Fort Wayne, and Chicago railroads (Map: Indiana, D 1). It has a fine courthouse and manufactures furniture, wagons, etc. There are also important live-stock interests. The water works, sewage system, and electric-light plant are owned by the city. Pop., 1890, 3027; 1900, 2975; 1910, 3448.

COLUM'BIAD. A heavy muzzle-loading cast gun, invented by Colonel Bomford and improved by Colonel Rodman, and combining some of the features of the gun, howitzer, and mortar, answering in this respect to the modern



COLUMBIAD.

breech-loading rifled mortar or howitzer. It appeared early in the nineteenth century and was in use until after the War of the Rebellion. See ARTILLERY; also BALLISTICS; GUNS, NAVAL; ORDNANCE.

COLUMBIAD, THE. A lengthy poem, by Joel Barlow (1807), enlarged from his previous *Vision of Columbus* (1787) and incorporating also some of his other poems.

COLUMBIA INDIANS. A term sometimes applied to all the Indians of Oregon and Washington, but specifically the name of a Salishan (q.v.) tribe, the Sinkiuse.

COLUM'BIAN EXPOSITION. See WORLD'S COLUMBIAN EXPOSITION.

COLUMBIA, or OR'EGON, RIVER. One of the largest rivers of North America. It rises in the eastern division of the Kootenai district in British Columbia, in about lat. 50° N. and long. 116° W. (Map: Washington, E 4). It flows at first northwest as far as lat. 52° and then turns sharply on itself and flows southward through a series of narrow lakes, crossing the international boundary line near the northeast corner of Washington. Just before crossing the boundary, it is joined by the Pend Oreille River (Clark's River or Fork), a large branch from the east, which by some geographers is considered a part rather than a branch of the main stream. In Washington it flows in a winding course, at first south (to a little beyond its junction with Spokane River), then west, then south, and then southeast to the Oregon line in about long. 119° W. Near the Oregon boundary it is joined by its largest branch, Snake River, which rises in Yellowstone Park. Below the point of junction the river flows in a westerly direction, forming the boundary between Oregon and Washington over the remaining distance to the Pacific, being joined on its way by the John Day, Deschutes, and Willamette rivers from the south. Its headwaters drain the Rocky Mountain region on the west from about lat. 54° N. to about lat. 42° N. Its length is 1300 to 1400 miles. Its total drainage area (including its tributaries) is about 259,000 square miles, of which about 48,000 square miles lie in Washington, 55,370 in Oregon, 81,380 in Idaho, 25,000 in Montana, and 38,700 in British Columbia, the remainder (10,550 square miles) being about equally divided between Nevada and Wyoming. Its flood discharge at The Dalles, Oregon, is estimated at 1,000,000 second feet, and the low-water flow at 40,000 second feet. The river is broken by falls and rapids into many separate portions; the first navigable reach is that from its mouth to the Cascades (160 miles) around which are built a canal and a portage railroad. About 50 miles above the Cascades are The Dalles, a series of falls and rapids extending over 12 miles to Celilo. From Celilo, 13 miles above The Dalles, it is navigable to Priest Rapids, 198 miles, and for several shorter stretches farther up, the total navigable length amounting to 756 miles. The total navigable mileage of the Columbia and its branches is 2132 miles. The important city of Vancouver, Wash., is built on its northern bank, just above the entrance of the Willamette, and Astoria, Oreg., is situated at the mouth of the river. The value of the river as a waterway is lessened by the fact that the entrance to its mouth is obstructed by a bar. Large vessels, however, ascend the Columbia to Vancouver, and also the Willamette to Portland. The tide ascends to the cascades about 150 miles from the sea, which are overcome by vessels through a lock constructed by the United States government. (See JETTY.) Its mouth forms the only fresh-water harbor on the Pacific coast, and the only deep-water harbor between Cape Flattery and San Francisco, a distance of 700 miles. The Columbia is famous for its salmon fisheries. This great river was long vaguely believed to exist. Its mouth was discovered only in 1792, by Captain Gray, of Boston, Mass., who gave it the name of his own vessel in place of the name "Oregon." It was partly explored by Lewis and Clark in 1804–05.

COLUMBIA SALMON. See QUINNAT.

COLUMBIA SERIES. In geology the accumulations of sands, gravels, and clays that are found along the Atlantic and Gulf Coastal Plain of the United States and that constitute the surface deposits, of later age than the Tertiary strata, within the area of their occurrence. They are equivalent in time with the Glacial deposits of the Northern States, but of course are of different origin, as the ice sheet did not extend farther south than northern Pennsylvania. The series is divisible into two or three phases, each represented by terraced beds along the stream valleys and coast, the higher and older terraces being more remote from the sea. There are very few fossils in the beds, and it is believed that the series in general is the work of streams and subaërial agencies rather than of marine deposition.

COLUMBIA UNIVERSITY. One of the most important educational institutions in the United States. Save for a few years during the Revolution, it has carried on its work in the city of New York since the middle of the eighteenth century and has always been identified closely with the development of the city and the State. It was the college of Alexander Hamilton, John Jay, Robert R. Livingston, De Witt Clinton, Hamilton Fish, and Abram S. Hewitt.

Since the beginning of the eighteenth century the idea of a college in the Province of New York had been discussed among the citizens, and when, in 1754, a fund of about £3500 had been obtained mainly through public lotteries, a royal charter for King's College was obtained from George II, and in the following year Trinity Church gave a plot of land on what is now Murray Street and West Broadway. The work of instruction began with the scholarly Dr. Samuel Johnson, as president and sole instructor, and eight students. The first Commencement was held on June 21, 1758. The first college building, erected on a portion of the King Farm, at what is now the corner of Park Place and Church Street, was completed in 1760. A Medical Department was founded in 1767 under Myles Cooper, the successor of President Johnson. In 1776 the buildings were seized by the Committee of Safety, and exercises were practically suspended until 1784, when the institution reopened as Columbia College, first under the regents of the State of New York, and from 1787 on under its own board of trustees (see infra). The new president was William Samuel Johnson. He was a son of the first president of King's College, one of the framers of the Constitution, and United States Senator from Connecticut.

Although the professors were many of them men of distinction, including Samuel L. Mitchill, later United States Senator, and Chancellor James Kent, the author of the famous Commentaries, the college was greatly hampered by poverty, and until past the middle of the nineteenth century its growth was slow. In 1849, however, came the appointment of the first of a series of four notable presidents —Charles King, Frederick A. P. Barnard, Seth Low, and Nicholas Murray Butler. Under President King, in 1857, came the moving of the college to Madison Avenue and Forty-ninth Street, the establishment of a Law School in 1858, and of a School of Mines in 1864. In 1860 came a formal union with the College of Physicians and Surgeons (founded in 1807). Under President Barnard, who succeeded President King in 1864, the institution grew rapidly. The growth of the city had greatly increased the income from the two main endowments of the institution—the gift of land from Trinity Church and the gift from the State Legislature, in 1814, of the Hosack Botanical Garden, now bounded by Forty-seventh and Fifty-first streets and Fifth and Sixth avenues. In 1880 came the establishment of the School of Political Science; in 1881, of a Department of Architecture; and during the same decade the development of courses in civil engineering; applied chemistry, and electrical engineering. One of the most important results of Barnard's presidency was the movement to provide for the higher education of women, which resulted in the establishment, in 1889, of Barnard College, and the opening of postgraduate studies to women on equal terms with men. President Barnard died in 1889, and his successor was Seth Low, of the class of 1870, formerly mayor of Brooklyn and, after his resignation as president, mayor of the city of New York. During his presidency the several flourishing but loosely connected schools were consolidated into a single organism. In 1890 a representative University Council was formed, and in the same year the School of Philosophy was established. The College of Physicians and Surgeons surrendered its charter and became an integral part of Columbia in 1891, and in 1892 the School of Pure Science was established.

In 1896 the trustees authorized the use of the title "Columbia University," the term "Columbia College" being reserved for the undergraduate courses for men. In 1897 the institution moved to a new site on Morningside Heights, where the first five of a group of academic buildings had been erected, the central one being a Library building given by Mr. Low as a memorial of his father. In 1900 Teachers College, founded in 1888, and Barnard College, while retaining their separate corporate existences, became integral parts of the educational system of the university, and in the same year a Summer Session was established.

On President Low's resignation in 1901, Nicholas Murray Butler, a graduate of the class of 1882, professor of philosophy and education and dean of the Faculty of Philosophy, was elected to succeed him. In 1903 the growth of the university made necessary the purchase of eight additional acres to the south of the original site, and in the same year Joseph Pulitzer made a gift of $1,000,000 to establish a School of Journalism, which was ultimately founded in 1912. In 1904 the work in extension teaching, which had been developing under the auspices of Teachers College, was formally made a part of the work of the university, and in the same year the New York College of Pharmacy, founded in 1829, became a professional school with the same relations to the university as those of Barnard College and Teachers College. The one hundred and fiftieth anniversary of the founding of King's College was celebrated in October, 1904, and included the laying of the corner stones of four new academic buildings. In the following year two of these buildings, with accommodations for 500 men, were opened as university residence halls.

During the first years of President Butler's administration careful consideration had been given to the place of undergraduate collegiate instruction in the university and its relation to professional training, and in 1905 a new programme of studies was adopted in Columbia College and Barnard College, which is so arranged as to make it possible for a properly qualified student to complete the requirements both for the B.A. and for the professional degrees of the university in six years. In 1906 came the formal establishment of the Faculty of Fine Arts, with schools of Architecture, Music, and Design. During the same year an interchange of professorships was effected with the German government. In 1911 a similar arrangement was made with France, and in 1913 with Austria.

Columbia University in 1913 comprised the following: *Undergraduate colleges:* Columbia College, with 877 students, and Barnard College (q.v.), with 618 students, each offering courses leading to the degrees of B.A. and B.S. *Professional schools:* School of Law, with 478 students, offering courses based upon at least three years of collegiate work and leading to the degree of B.C.L.; the College of Physicians and Surgeons, with 344 students, offering a four-year course leading to the degree of M.D.; the schools of Mining, Engineering, and Chemistry, with 669 students, offering courses of four years each and leading to the degrees of E.M., Met.E., C.E., E.E., Mech.E., Chemist, and Chem.E.; the School of Journalism, with 76 students, offering a four-year course in letters, science, and practical journalism leading to the degree of Bachelor of Literature; Teachers College (q.v.), with 1684 students, offering courses open to men and women, leading to the degree of B.S. and to the several diplomas in teaching; the Faculty of Fine Arts, with 157 students, offering courses leading to degrees and certificates in architecture, music, and design; the New York College of Pharmacy, with 414 students, offering university courses leading to the degrees of Pharmaceutical Chemist, Bachelor of Science in pharmacy, and Doctor of Pharmacy. *The nonprofessional graduate schools* of Political Science, Philosophy, and Pure Science, with 1570 students, offer advanced courses and opportunities for research, leading to the degrees of A.M. and Ph.D., in philosophy and education, psychology and anthropology; ancient and modern languages and literatures; history, economics, and public law; the mathematical, physical, chemical, biological, and geological sciences; mining, metallurgy, and engineering (civil, electrical, mechanical, sanitary, and chemical). The Summer Session of six weeks' duration, with 4539 students in 1913, and the system of Extension Teaching, with 1828 students, offer additional opportunities to those who cannot attend the regular courses of instruction. The teaching staff of the university, exclusive of administrative and emeritus officers, numbers 706.

Women are admitted as undergraduates at Barnard College, as professional students at Teachers' College and at the College of Pharmacy, as graduate students by the faculties of Philosophy, Political Science, and Pure Science, and to the Summer Session and Extension courses. They are not admitted to the schools of Law, Medicine, Applied Science, or Architecture.

The title to all property in the central corporation (The Trustees of Columbia College in the City of New York) is vested in a board of 24 trustees, whose term of office is for life and who form a self-perpetuating body, appointing all officers of instruction and administration and having general oversight and control of the affairs of the university. In 1909 provision was made for the nomination by the alumni of six of the 24 trustees. The president has charge of the educational administration and is chairman of the University Council and of every faculty. The deans, under the general supervision of the president, have immediate charge of the work of the several faculties. The University Council, a representative body consisting of the president and the dean, and one elected member from each faculty, has immediate charge of the regulations for the higher degrees, the appointment of university fellows and scholars, and the correlation of courses. It has also the power to make recommendations concerning the educational administration of the university and to advise the president upon matters of general policy. The professors and other officers of instruction are divided among 58 departments, grouped into 14 divisions.

The total assets of the university exceed $50,000,000 in grounds, buildings, and invested funds. The budget of 1913 amounted to $2,367,269.33, and the income for the previous year to $2,038,354.22.

The University Library numbers about 500,000 bound volumes, including the Avery Architectural Library and the Phœnix collection. A number of learned societies make it the depository of their collections. The numerous laboratories and museums of the university are all well equipped. See Plate of NEW YORK.

The buildings of the Corporation of Columbia University at Morningside Heights include, besides the central Library, the following: Havemeyer Hall, given by the family of Frederick Christian Havemeyer and used for chemistry; Fayerweather, for physics and astronomy; Schermerhorn, given by William C. Schermerhorn and used for the other natural sciences; Engineering; School of Mines, given by Adolph Lewisohn for mining and metallurgy; Hamilton, given by John Stewart Kennedy for Columbia College; Journalism, provided by the gift and bequest of Joseph Pulitzer for the purpose of the School of Journalism; Avery, the gift of Samuel B. Avery, containing the Avery Architectural Library and the School of Architecture; Earl, given by William E. Dodge as a building for the students; St. Paul's Chapel, the gift of Olivia E. P. Stokes and Caroline Phelps Stokes, one of the most beautiful ecclesiastical interiors in New York, with windows by John La Farge; and University (unfinished). The resident halls are: Hartley, a memorial to the late Marcellus Hartley, given by his daughter and grandson; Furnald, given by the family of Royal B. Furnald, a member of the class of 1901; and Livingston. On the extreme east of the group are the Crocker Research Laboratory and the residence of the president of the university; and in the neighboring West One Hundred and Seventeenth Street the Deutsches Haus, the gift of Edward D. Adams, and the Maison Française, the gift of A. Barton Hepburn, centres respectively of German and French interests.

The buildings of Barnard College are immediately to the west, and those of Teachers College

to the north, of the university site. The Medical School is on Fifty-ninth Street, between Ninth and Tenth avenues, and the College of Pharmacy in West Sixty-eighth Street. The entire university occupies more than 34 acres of ground in New York City, and has, in addition, a Summer Camp of Surveying and Geodesy, covering 500 acres, in Morris, Conn.

The university is intimately connected with the other educational enterprises of the city. The head of the Union Theological Seminary and of the General Theological Seminary are nonvoting members of the University Council, and the directors of the American Museum of Natural History, the Metropolitan Museum of Art, and the president of the National Academy of Design are members of one or another of the Columbia faculties. Columbia professors deliver lectures at these museums and at Cooper Union and conduct courses in special investigation at the Botanical and Zoölogical gardens. The university makes annual provision for more than 200 fellows and scholars, whose stipends range from $150 to $1500. In the academic year 1912–13, $120,279 was earned by self-supporting students. Under the auspices of the Columbia University Press, established in 1903, has appeared a notable series of scholarly volumes, 172 in all. The *Columbia University Quarterly*, the *Political Sciences Quarterly*, the *School of Mines Quarterly*, and, in addition, 21 departmental series and 13 journals are issued under the editorial direction of university officers, and 20 more with their coöperation. There are also 10 student publications. Consult: *A History of Columbia University, 1754–1904* (New York, 1904); Nelson, *Columbiana: A Bibliography* (ib., 1904); *An Official Guide to Columbia University* (ib., 1912).

COLUMBIAN UNIVERSITY. See GEORGE WASHINGTON UNIVERSITY.

COL'UMBINE (Fr., It. *Columbina*, from Lat. *columbinus*, dovelike, from *columba*, dove). 1. A conventional character in old Italian comedy and the pantomime, first appearing about 1560. She was the daughter of Pantaloon and the object of Harlequin's adoration and so appears in English pantomime. See PANTOMIME. 2. A wild flower, emblematic of forsaken lovers in old English verse.

> "The columbine in tawny often taken,
> Is then ascribed to such as are forsaken."
> Browne's *British Pastorals*, 1613.

COLUM'BITE. An iron and manganese niobate which passes chemically by such insensible gradations into the mineral tantalite, an iron tantalate, that it is impossible to separate the two mineral species. The iron and manganese vary widely, and tin and tungsten are also often present in small amounts. Columbite crystallizes in the orthorhombic system. It has a bluish iridescence and is of an iron-black, grayish, or brownish color. This mineral occurs in granitic and feldspathic veins in the form of crystals, crystalline granules, and cleavable masses. It is found at various localities in Bavaria, Italy, Finland, Greenland, and in the Ural region; in the United States it is found in greater or less abundance in nearly all of the States bordering along the Appalachian Mountain system, in the Black Hills of South Dakota, and in California and Colorado. It has some slight economic value for the preparation of salts of niobium and tantalum, but as only small quantities of these salts are used, the mineral is in but little demand. It is interesting to mention that the first occurrence of columbite in America was made known from a specimen sent by Governor Winthrop of Connecticut to Sir Hans Sloane, then president of the Royal Society of Great Britain.

COLUM'BIUM (Neo-Lat., from *Columbia*, United States of America), or NIOBIUM. A metallic element discovered by Rose in 1846. It is found in the minerals columbite, from Haddam and Middletown, Conn., and tantalite, from near Falun and elsewhere in Sweden; also in small quantities in other minerals. In order to obtain the element the mineral is fused with acid potassium sulphate; the resulting mass, which is washed and boiled with concentrated hydrochloric acid, yields the hydroxide, which is then reduced. However, the purest metallic columbium that has yet been obtained still contained nearly 0.3 per cent of hydrogen. A metallic columbium containing about 3 per cent of carbon was obtained in 1901 by Moissan, by heating in the electric furnace a mixture of 82 parts of columbic acid and 18 parts of pure carbon. The product did not melt in the oxy-hydrogen flame and was hard enough to scratch quartz readily. Columbium (symbol Cb or Nb, atomic weight 93.5) is a steel-gray powder with a specific gravity of 7.06 at 15° C. It forms three oxides with oxygen, of which the pentoxide, Cb_2O_5, forms salts called *columbates* or *niobates*.

COLUM'BUS. A city and the county seat of Muscogee Co., Ga., 95 miles (direct) south-southwest of Atlanta, at the head of navigation on the Chattahoochee River and on the Central of Georgia, the Southern, and the Seaboard Air Line railroads (Map: Georgia, B 3). Steamboats ply between Columbus and Apalachicola, Fla. The city, from its important manufactures called the "Lowell of the South," is also the centre of a fertile agricultural region, and has vast water power, the river having at that place a fall of 120 feet in three miles, developing 67,000 horse power. The trade with adjoining States is extensive. Columbus receives annually 350,000 bales of cotton, 100,000 bales of which are used in its manufactures of cotton goods. It has foundries and machine shops, cottonseed-oil mills, refineries, barrel factories, and manufactories of caskets, bank and show-case fixtures, ginning machinery, agricultural implements, fertilizers, and ice. Columbus contains an industrial school, a conservatory of music, and a public library. The water works are under municipal control. Pop., 1890, 17,303; 1900, 17,614; 1910, 20,554.

Columbus was laid out in 1828 and incorporated in 1829. During the Civil War it was an important Confederate depot of supplies and was only surpassed by Richmond in the quantity of manufactured articles furnished to the Confederate army. It was captured by Federal forces April 16, 1865.

COLUMBUS. A city and the county seat of Bartholomew Co., Ind., 41 miles south by east of Indianapolis, on the Pittsburgh, Cincinnati, Chicago, and St. Louis, and the Cleveland, Cincinnati, Chicago, and St. Louis railroads, and on the east fork of the White River (Map: Indiana, D 3). It has extensive manufactures of pulleys, tanned leather, threshing and sawmill machinery, tools, transmission gears, gasoline engines, flour, furniture, etc. Settled in 1821, Columbus was chartered as a city in 1864.

The government is vested in a mayor, elected quadrennially, and a city council. The water works and electric-light plant (for city use) are owned and operated by the municipality. Pop., 1900, 8130; 1910, 8813.

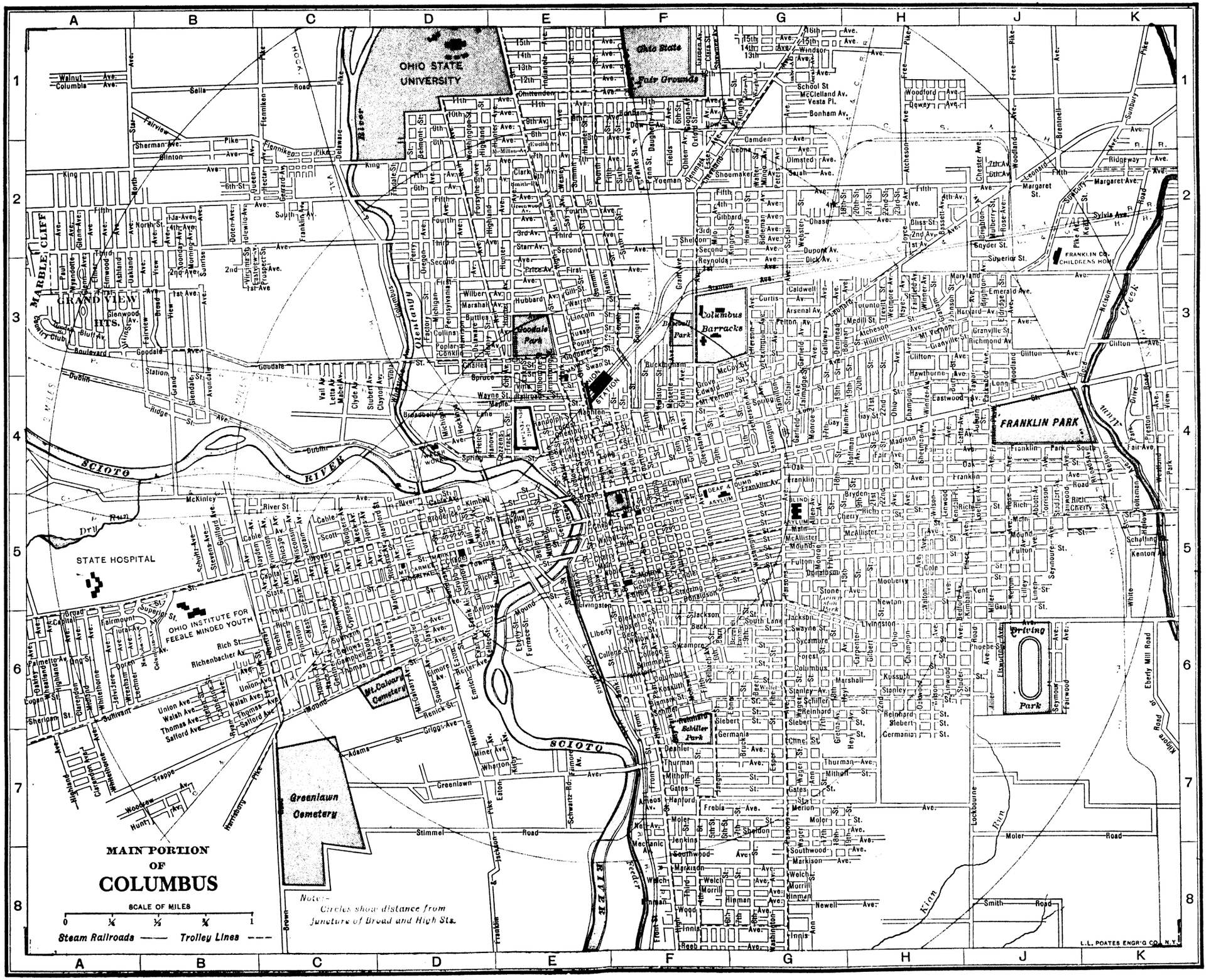
COLUMBUS. A city and the county seat of Cherokee Co., Kans., 53 miles by rail south of Fort Scott; on the St. Louis and San Francisco, the Joplin and Pittsburg, and the Missouri, Kansas, and Texas railroads (Map: Kansas, H 8). It is the centre of a farming and a coal, lead, and zinc mining region, has a considerable trade in agricultural products, and contains machine shops, grain elevators, flour mills, cigar factory, bottle works, canning factory, and an extensive brick-making plant. Natural gas occurs in the vicinity. A Carnegie library and fine high school are notable features. The water works are the property of the municipality. Pop., 1900, 2310; 1910, 3064.

COLUMBUS. A city and the county seat of Lowndes Co., Miss., 123 miles, by rail, west of Birmingham, Ala.; on the Tombigbee River, which is navigable six months of the year, and on the Mobile and Ohio and the Southern railroads (Map: Mississippi, J 3). It has a public library, two hospitals, and is the seat of the State Industrial Institute and College for young women, Franklin Academy, for white, and Union Academy, for negro children. Columbus carries on an extensive trade in cotton, hay, and gravel. It has cotton and oil mills, foundries and machine shops, brickkilns, stave works, lumber mills, and manufactories of plows, underwear, hosiery, comforts, yarn, and stoves. To the east there are coal and iron in abundance. Columbus was settled in 1830, incorporated in 1832, and is governed at present under a charter of 1884, which provides for a mayor, elected every two years, and a council, elected on a general ticket. The water works are owned and operated by the city. Pop., 1900, 6484; 1910, 8988.

COLUMBUS. A city and the county seat of Platte Co., Neb., 92 miles by rail west by north of Omaha; on the Loup River a short distance above its confluence with the Platte, and on the Union Pacific and the Chicago, Burlington, and Quincy railroads (Map: Nebraska, G 3). It is of importance as a railroad junction and has flour mills, foundry, brewery, wooden-shoes factory, roller mills, and a creamery. The city contains a hospital and a Carnegie library, and owns its water works. Along the Loup River are ancient Indian mounds, and the city is believed to occupy the site of the old Indian city of Ouivera. Pop., 1900, 3522; 1910, 5014.

COLUMBUS. The capital of Ohio and the county seat of Franklin County, the third city of the State in population. It is situated at the confluence of the Scioto and Olentangy rivers and extends eastward to Alum Creek, near the geographical centre of the State, 120 miles northeast of Cincinnati and 135 miles southwest of Cleveland (Map: Ohio, E 6). The city is built on generally level ground, at an altitude of 780 feet, and covers an area of about 22 square miles. Its two main central thoroughfares, High Street and Broad Street, intersect at right angles, and other streets in the central portion conform. High Street is the main business thoroughfare, 100 feet wide; Broad Street, 120 feet wide, with four rows of trees for a considerable portion of its length, is a street of public buildings, churches, and fine residences. At the southeast corner of High and Broad streets is the Capitol Square of 10 acres, in the centre of which stands the Capitol building (completed in 1857), a gray stone structure of the Grecian Doric style of architecture, 304 feet long, 184 feet wide, with a rotunda 158 feet high. To the east, connected with it by a wide terrace, is the Judiciary building (completed in 1900), in which are a number of other State offices. Notable art features of the interior of the Capitol are William H. Powell's painting of "Perry's Victory on Lake Erie," portraits of all the Ohio governors, and Thomas D. Jones's sculptured representation of the surrender of Vicksburg by Pemberton to Grant. At the west entrance to the square is the McKinley memorial (H. A. McNeill, sculptor), and near the northwest corner of the building, the "Ohio's Jewels" group of statues of Grant, Sherman, Sheridan, Chase, Stanton, Garfield, and Hayes. Other public buildings are the city hall, chamber of commerce, the post office and Federal court, and the Y. M. C. A., all facing Capitol Square. On Broad Street is the Soldiers' and Sailors' Memorial building, with an auditorium seating 4000, and at the head of State Street is the Columbus Public (Carnegie) Library. Ohio State University (q.v.), established by Act of 1870 as Ohio Agricultural and Mechanical College and reorganized in 1878 under its present name, is located here. Other educational institutions are: Capital University (Lutheran), founded in 1850; St. Mary's of the Springs (Catholic), in 1866; St. Joseph's Academy (Catholic), 1875; Columbus Art School; and three private schools of academy grade, two for girls and one for boys. The State schools for the blind, for the deaf and dumb, and for the feeble-minded are also located in Columbus, as well as the State central hospital for the insane, and the Ohio penitentiary, which is soon to be removed to a 1500-acre farm in Madison County. Of county buildings there are the courthouse, the children's home, infirmary and tuberculosis hospital (completed in 1914). Other hospitals are: St. Francis, St. Anthony's, Mount Carmel, Grant, St. Clair, Protestant, and Mercy. Besides the Library of Ohio State University (140,000 volumes), there are here Ohio State Library (225,000 volumes), including a traveling library (88,000 volumes), available for responsible organizations in any part of the State and having departments of library organization and legislative reference; Columbus Public Library (85,000 volumes), including an endowed music section (7500 volumes) and a Lincoln collection (2000 volumes); Public School Library (90,000 volumes), miscellaneous and supplementary reading, and the Law Library of the Supreme Court, with complete sets of State, Federal and many foreign reports, statutes, and digests. The city has nine parks, with a total area of 260 acres, two amusement resorts, and a United States military post and recruiting station, the grounds of which are beautifully parked and open to the public. The Ohio State fair grounds of more than 100 acres, with walks, driveways, and buildings, some of which are used by the Ohio College of Agriculture, is just outside the city's north boundary line.

Columbus is an important commercial and manufacturing centre because of its nearness to the coal, iron, and natural-gas fields and its position on the line of East and West travel. Nine trunk-line railroads, 16 divisions, and 7 electric interurban traction lines afford excel-


OHIO STATE UNIVERSITY
Ohio State Fair Grounds
MARBLE CLIFF
GRAND VIEW HTS.
Columbus Barracks
Goodale Park
FRANKLIN PARK
STATE HOSPITAL
OHIO INSTITUTE FOR FEEBLE MINDED YOUTH
Mt. Calvary Cemetery
Greenlawn Cemetery
Schiller Park
Driving Park
FRANKLIN CO. CHILDRENS HOME
SCIOTO RIVER
MAIN PORTION OF COLUMBUS
SCALE OF MILES
0 ¼ ½ ¾ 1
Steam Railroads —— Trolley Lines ----
Note:- Circles show distance from Juncture of Broad and High Sts.
L.L. POATES ENGR'G CO. N.Y.



Ohio "Jewels" Monument

STATE HOUSE, COLUMBUS, OHIO

THE WEST FRONT

McKinley Memorial

lent transportation facilities for the manufacturing interests. The city is connected by a feeder with the Ohio Canal, completed to the Ohio in 1832. It is also on the line of the National Road from Cumberland, Md., westward, completed and turned over to the States in 1836. Including the industries located just outside the city limits, there are here 700 manufactories, with an annual product valued at $70,000,000. Fifty-eight of these are foundries or machine shops. Carriages, wagons and materials, boots and shoes, patent medicines and compounds, malt liquors, tobacco, regalia, society emblems, and oleomargarine are leading products. More than half of the forged anvils used in the United States and most of the piano stools are made here.

The government is administered by a mayor and a unicameral council elected every two years, the mayor appointing the director of safety and the director of public service. The people elect the treasurer, auditor, and solicitor. A charter commission, elected in 1913, submitted, in May, 1914, a new charter offering a modified Federal form, with a number of progressive features, such as nonpartisan ballot, preferential voting, recall of elected officials, the referendum, and a small council elected at large. The charter was adopted, effective January 1, 1916. The city has its own water works, electric-light plant, garbage and refuse disposal, sewage disposal and sewer farm, and other and more common public utilities. The investment in the four mentioned is about $8,500,000. The water-works system includes a storage reservoir and filtration system. Current from the electric-light plant lights the streets and municipal buildings, while garbage reduction is done at a net annual profit of about $25,000. There are 300 miles of sewer and 240 miles of paved streets. City assets (1913), $35,157,723.63; liabilities, $17,633,831.92. Pop., 1830, 2435; 1850, 17,882; 1870, 31,274; 1890, 88,150; 1900, 125,560; 1910, 181,511.

The first permanent settlement within the city limits was made by Lucas Sullivant and party, in 1797, at the confluence of the two rivers, and was named Franklinton. Columbus was platted on the east bank of the Scioto in 1812, and the site was accepted by the Legislature for the capital. In the first Capitol building the Legislature first met in 1816. In that year Columbus became a borough; in 1834 it became a city, and in 1870 Franklinton was annexed. In 1832 and again in 1849 the city suffered severely from cholera. In March, 1913, a flood devastated the West-side lowlands; 4071 dwelling houses were flooded, 345 being damaged beyond repair; 20,000 persons were fed and sheltered for many days, the property damage was estimated at $5,625,000, and 94 lives were lost. Consult: J. H. Studer, *Columbus, Ohio: Its History and Resource* (Columbus, 1873); Alfred E. Lee, *History of the City of Columbus* (New York, 1892); Fitzpatrick and Morris, *The Franklinton Centennial* (Columbus, 1897); W. A. Taylor, *Centennial History of Columbus.*

COLUMBUS. A city and the county seat of Colorado Co., Tex., 87 miles by rail west of Houston, on the Colorado River and on the Southern Pacific Railroad (Map: Texas, D 5). It is in a fertile agricultural region and has a considerable trade in cotton, live stock, hides, etc. The water works are owned by the city. Pop., 1890, 2199; 1900, 1824; 1914, about 1800.

COLUMBUS. A city in Columbia Co., Wis., 63 miles east-southeast of Milwaukee, on the Chicago, Milwaukee, and St. Paul Railroad, and on Little Crawfish River (Map: Wisconsin, D 5). Columbus contains the county normal school, St. Mary's Hospital, and a public library. It is in an agricultural and stock-raising district and has pea canneries, brewery, flour mill, and carriage and wagon shops. Pop., 1900, 2349; 1910, 2523.

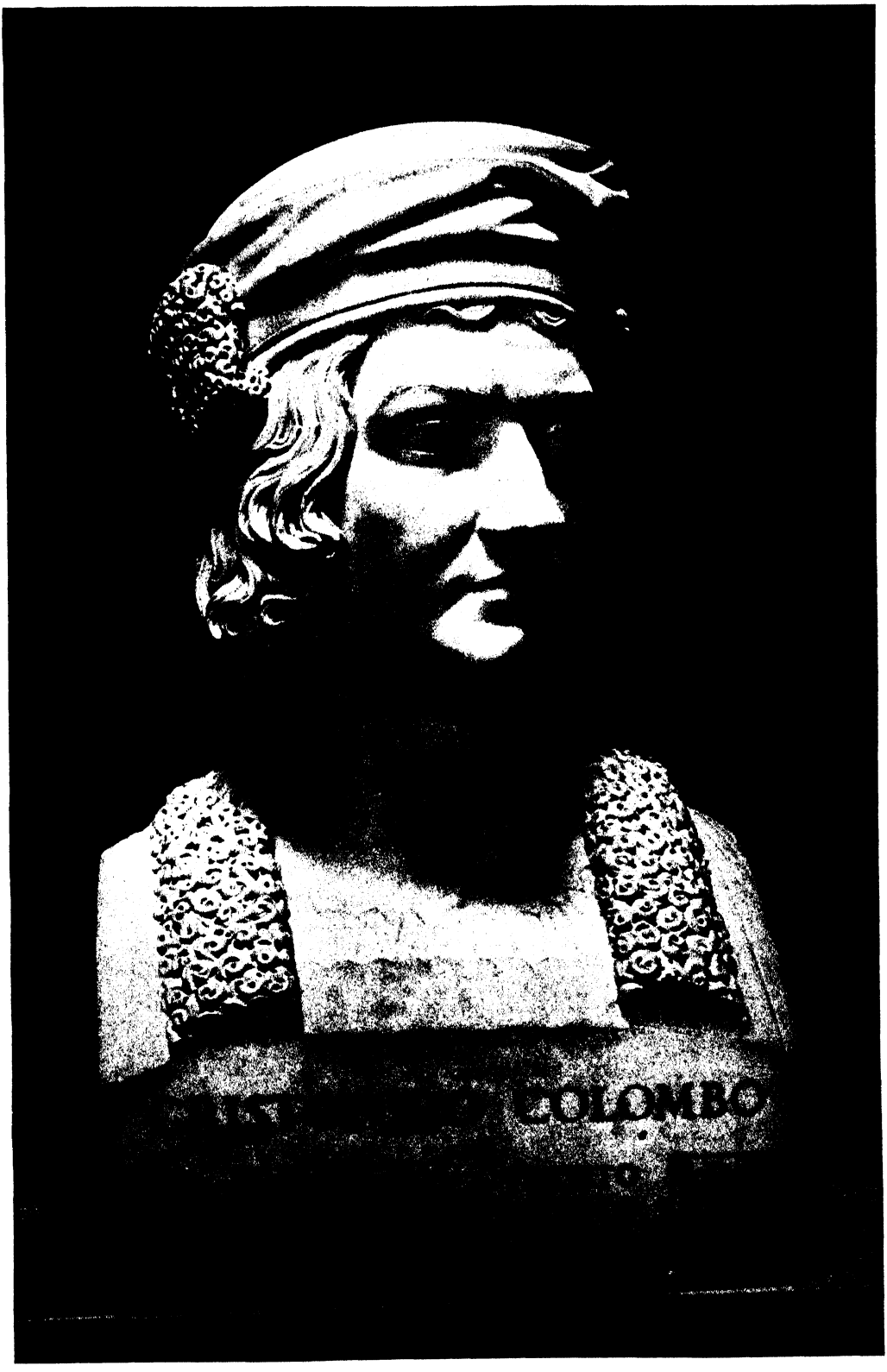
COLUMBUS, Bartholomew (Bartolomé Colón) (c.1461–1514). A brother of Christopher Columbus. He was a sailor by profession and in the year 1480 joined Christopher at Lisbon. In 1489 he was sent to England by his brother to seek assistance from Henry VII for the execution of his project. He was taken by pirates and landed in England in a destitute condition, and on presenting himself at court was unfavorably received by the King. He then sought help at the court of Charles VIII in France. Accounts vary as to the treatment he received here, some authorities claiming he was unfavorably received, and others saying that, because of the news of Columbus' successful expedition, Charles received him well and aided him on his return journey. Whatever may be the truth of this matter, in January, 1494, he returned to Spain and was given command of a fleet of three caravels sailing for Española. He arrived there in June of the same year, just in time to render effectual assistance to his brother, who was being hard pressed by the unruly members of the little Spanish colony. From that time on he became the most devoted follower of the Admiral, who in 1495 made him hereditary *Adelantado,* or Governor, of Española, a title which was confirmed by the crown in 1497. In March, 1496, he assumed command of the colony on the departure of his brother. He founded the town of San Domingo and effectually repressed a native insurrection. During the hardships of the last voyage of Christopher Columbus Bartholomew proved of invaluable assistance. At Puerto la Gloria in 1504 he repressed a mutiny among the sailors. Late in life he received some recognition for his services from the crown, which bestowed on him the island of Mona, near Española, as a possession. He died at Seville in December, 1514.

COLUMBUS, Christopher (the usual English form, adopted from the Latinized form of the Italian Colombo, which was the original spelling of the family name. After the discoverer entered the Spanish service he became known as Cristóbal Colón) (1451–1506). The discoverer of America. There have been so many fanciful tales related, and so many wild guesses made, concerning the life and work of Columbus that we decide to give here a brief documentary chronology of his life down to 1493, beyond which point there is less confusion. This chronology is obtained from Henry Vignaud's *Histoire critique de la grande entreprise de Christophe Colomb,* where all the documents are cited.

Columbus was born in Genoa between Aug. 26, 1451, and Oct. 31, 1451. His father was Domenico Colombo, a weaver, and his mother, Susanna Fontanarosa. There were neither nobles nor sailors in the family, all of whose members were artisans. Nor was Columbus related to the noble family of Colombo of Cuccaro, nor to the two admirals called Colombo. He had no university training, did not navigate in his youth, and in 1472 was still a weaver in Savona.

The last date at which we are certain of his residence in Italy is Aug. 7, 1473. He did not serve under the two admirals Colombo, and made no campaign under "King" René d'Anjou, Count of Provence. About 1474–75 he made, from Genoa or Savona, a voyage to Chios, probably with the two Genoese, Spinola and Di Negro. In 1476 he embarked, again from Genoa or Savona, in one of several Genoese merchantmen bound for England. These vessels were attacked at St. Vincent, Aug. 13, 1476, and Columbus took refuge at Lisbon. Later he continued to England and sailed up into the Northern Seas, but did not reach Iceland. In 1477–78 we find him in commerce at Lisbon. In August, 1479, he visited Genoa and left a deposition stating that he was a citizen of Genoa and about 27 years old. In this year or the next he married, at Lisbon, Felipa Moniz Perestrello, whose exact relationship with the families of Moniz and Perestrello is not well established. In 1480, and probably at Lisbon, was born Diego Columbus, oldest son of the discoverer, and his only child by his marriage. After his marriage his mother-in-law gave him certain papers of Perestrello which made Columbus decide to devote himself to maritime discovery, It was in 1481 that the apocryphal correspondence with Toscanelli was supposed to have taken place. From 1482 to 1484 Columbus is supposed to have made several voyages to the coast of Guinea, and he claims to have measured the length of a degree at the equator; and during this same period he made to João II of Portugal the same proposals that he made later to the Spanish rulers. João II rejected them, although in 1484 he is supposed to have sent a secret mission to learn the truth of Columbus' claims. Late that year or early the next, angered at the conduct of João II, Columbus fled secretly with his young son (his wife being already dead) to Spain. In 1485 he left Diego at La Rábida (two of whose monks, Pérez and Marchena, encouraged his plans), went to Seville, saw the two dukes of Medina Sidonia and Medina Celi, and lived awhile with the latter. Early the next year he went to Córdoba, was well received by the sovereigns (who granted him an audience in April or May), and followed them in November to Salamanca, where he was permitted to appear before a royal commission appointed to examine his pretensions. The university does not appear in the proceedings, but there were favorable conferences held in the monastery of San Estéban. Early in 1487 he returned to Córdoba, received certain sums from the royal purse, as a gratification or for services rendered, and began in November or December his affair with Beatriz Enríquez de Arana, who was neither noble nor rich, nor ever became his wife. During 1488 occurred an exchange of letters between Columbus and João II, and possibly a brief visit of Columbus to Portugal. In July he received a further gratification from the Spanish rulers; and on August 15 of this same year, 1488, his mistress Beatriz Enríquez de Arana gave birth to their son Ferdinand. The Spanish rulers, in May, 1489, ordered him to court, which was probably at Baza, where they were conducting a siege. During 1490, however, he was in dire want and is supposed to have sold books and made maps for a living; and the royal commission finally rejected his plans. In discouragement he left the court, and started for France to offer his services to Charles VIII, going first to La Rábida to get his son Diego. Here he was encouraged to give up his plan of going to France and to continue his efforts in Spain. He met Pero Vázquez de la Frontera (who gave him much valuable information about islands beyond the Sargasso Sea) and Alonso Martín Pinzón (who had been to Rome and obtained information about the island of Cypangu), and the latter agreed to aid him. Pérez then wrote to the court, and Pinzón is supposed to have done likewise. Pérez, summoned by the Queen, easily arranged for Columbus' recall, and late in the year began the celebrated Santa Fé conferences, in which Columbus named his conditions: a peerage, the office of admiral, and that of Viceroy of the lands he should discover, etc. Columbus was present at the fall of Granada, Jan. 2, 1492. Later in the same month the Commission of Santa Fé rejected his proposals as chimerical, and Columbus left Granada with renewed intention of going to France. But Luís de Santángel intervened, and Columbus was immediately recalled. Matters now moved more rapidly. By the Capitulations of Santa Fé (April 17, 1492) he was authorized to search for and take possession of certain islands, but no mention was made of the Indies or of India. By the Capitulations of Granada (April 30) the titles and offices of Columbus were confirmed and made hereditary, but he was to be invested with them only after the discoveries had been made. This document and its confirmation (Act of April 23, 1497) both fail to make any mention of India. After various delays, some of which were due to the unwillingness of sailors or others to embark on such an expedition, Pinzón, whom Columbus for a while seems to have neglected, threw his influence into the movement, and the expedition was organized: three vessels (*Santa María*, *Pinta*, and *Niña*), 120 men (of whom 90 for the crews), baggage, merchandise for trading, provisions, and a little artillery.

The expedition set sail from Palos, Aug. 3, 1492, made a short stay in the Canary Islands, and sailed from Gomera on September 6. At the moment of sailing Columbus gave his captains and pilots written instructions not to sail during the night after they should have proceeded 700 leagues, as he expected to find land before they had gone 750 leagues. There were various symptoms of revolt during the month; and when on October 4 or 5 (despite Columbus' not having announced the full distance sailed each day) they had gone farther than the 750 leagues mentioned by Columbus, the crews mutinied and wished to return to Spain. Pinzón's energetic attitude, when consulted by Columbus, restored order, and they proceeded. October 7, on Pinzón's advice, they changed their course, which thitherto had been due west, and steered somewhat south of west. The sailors again became terrified, but Columbus succeeded in calming them, and told them that having come so far on his way to *las Indias*, he intended to go through at any cost. This is the second time that the words *las Indias* appear in the Las Casas version of Columbus' log. They were never used in the negotiations that led to his being authorized to make the expedition, which spoke consistently of his going to "discover and take possession of certain islands in the sea of whose existence Columbus knew." Nor is their presence in his log proof that he was really



CHRISTOPHER COLUMBUS

FROM THE BUST IN THE CAPITOLINE PICTURE GALLERY, ROME

looking for India by a western route, for the usage of the times when Las Casas made his résumé of the log applied the words *las Indias* to the Antilles as well as to India. In the early morning hours of Oct. 12, 1492, land was discovered, and at daybreak they disembarked on an island called by the natives Guanahani. Columbus took possession of it and called it San Salvador. There is some uncertainty concerning the exact situation of this island. Columbus was certain that Guanahani was not the marvelous island of Cypangu. After considerable cruising and doubting he finally decided that Cuba must be Cypangu, and disembarked October 28. Further explorations, including the determining of the longitude and latitude of the island, forced him on November 2 to the conclusion that Cuba was not Cypangu, but a projection of Asia. In further explorations Pinzón became separated from Columbus, and on November 22 discovered the island of Haiti. Columbus rejoined him on December 5 and named the island Española. Although the log does not say so, Columbus himself says elsewhere (as do also his son, his brother, and Las Casas) that he recognized it as being Cypangu, and he continued in that belief until his death. On December 26 they built the fort of La Navidad and left 37 men, with ample provisions, as a garrison. December 28 the *Santa Maria* was wrecked, and all on board went to the *Niña*. The return voyage was begun Jan. 4, 1493. In the Azores, which they reached February 15, Columbus wrote his first account. March 4 he reached Lisbon, where he wrote his second account. On invitation of the King of Portugal, Columbus went to see him on March 9, and on the 15th disembarked at Palos and dispatched a courier to the "Catholic Kings," who were at Barcelona. On the 30th they acknowledged the receipt of his letters and invited him to come to them at Barcelona. In their letter they spoke of his discoveries as having been made in *las Indias*. This royal letter is the first official document in which this expression appears. In bulls of May 3 and 4, 1493, the Pope sanctioned the rights of the "Catholic Kings" to the islands and lands discovered by Columbus, who was spoken of as having been sent to discover distant islands and lands situated in seas that no one had yet sailed. There was in these bulls no mention of the route to India.

Every assistance was promised Columbus towards equipping a second expedition. Seventeen vessels were soon ready, carrying 1500 persons, and on Sept. 25, 1493, they set sail. The island of Dominica was reached on November 3, and on the 27th Columbus anchored off the fort of La Navidad, which was found deserted. The garrison had been killed by the natives, whom the outrages committed by the white men had provoked beyond endurance. Abandoning this, Columbus founded a new town (Isabella), and the next two years were spent in an attempt to establish a form of government and in several exploring expeditions into the interior of Española and the neighboring islands. Many causes united to disturb the peace of the colony, and Columbus at length determined to return to Spain, where his enemies were actively trying to undermine the confidence of the sovereigns in him. Landing at Cádiz on June 11, 1496, he proceeded directly to the court, where he was most graciously received and quickly restored to grace. He was promised whatever he desired for a new expedition, but there was a long delay, due largely to the persistent opposition of Fonseca, Bishop of Palencia, through whose hands everything had to pass before Columbus could secure his outfit. It was not until May 30, 1498, that six vessels were ready to sail. A more southerly route than before was followed, and the voyage was prolonged until July 31, when the three peaks of Trinidad were sighted. After a fortnight's rest in the Gulf of Paria Columbus coasted the South American mainland, which he now saw for the first time, westward as far as Margarita, and then, having first decided that Paradise must be situated in the interior of the modern Venezuela, he stood across to Española. Arriving at Santo Domingo, which had become the principal town in the Indies, he learned that a number of the colonists had rebelled during his absence and that everything was at odds. His temperament was ill suited to dealing with the turbulent crowd who defied his authority, and he could do little towards restoring peace and order. Both sides sent agents and emissaries to Spain, with the result that, on Aug. 23, 1500, Francisco de Bobadilla arrived at the island with royal orders authorizing him to supersede Columbus in the government. Without waiting to investigate the charges against him, Bobadilla arrested Columbus, treating him with heartless indignities for which no justification can be found in the surviving records of the colony. He was placed in irons, denied visits from his brothers and partisans, and in October sent back to Spain.

The news that the Admiral of the Ocean Seas had arrived home in chains served his cause better than any argument. He was promptly released and summoned to court, where every favor was shown him. King Ferdinand, however, was too shrewd to restore him to the full powers of control which he claimed by virtue of his discovery. As soon as he became convinced that there was little use in trying to secure his rights, Columbus asked for a fleet with which to continue his discoveries. This was readily granted, and in May, 1502, he set sail with four caravels to seek a route to the real East. A part of the royal grant was the condition that he should not revisit Española, but on June 29 Columbus anchored off Santo Domingo. Being forbidden to enter the harbor, he refitted as best he could outside, where he successfully weathered a storm which, curiously enough, overwhelmed a fleet on which Bobadilla and several of his bitterest enemies had set sail for Spain. Columbus proceeded westward, and between July 30, 1502, and Jan. 24, 1503, he sailed along the coast of Central America, from Honduras to Veragua, where he attempted a settlement. In April, 1503, the disheartened survivors insisted on abandoning the enterprise. With the greatest difficulty the rotten ships were brought as far as Jamaica, where, in August, they had to be beached to save their cargoes. The Admiral had been confined for many weeks to his bed, with a complication of mental and bodily ailments, from which he aroused himself at moments of special danger to show his earlier courage, enthusiasm, and skill. From Jamaica a messenger, Diego Mendez, started across to Cuba in a canoe to seek help at Santo Domingo. It was many months before the pitiful survivors learned that he had not perished on the way. He reached Española in safety, but Ovando, who had succeeded Bobadilla, delayed as long as he

could before permitting Mendez to hire a vessel to go to the rescue of the castaways on Jamaica. At last, in June, 1504, the survivors who had remained faithful to the Admiral through dangers and disasters were once more embarked on their way back to civilization. Refitting the vessel at Santo Domingo, Columbus proceeded to Spain, landing at San Lucar de Barrameda on November 7. Before the end of the month Queen Isabella, upon whom all his hopes rested, died. Columbus went to Seville, where he busied himself during such intervals of freedom from pain as he had in trying to put his affairs in order. In May, 1505, he vainly journeyed to Segovia to plead with the King for some recognition of his rights and those of his son. Thence he retired to Valladolid, where he died, May 20, 1506. His body was laid in the Carthusian monastery of Santa María de las Cuevas at Seville, but in 1542 it was removed, with that of his son Diego, to be interred in the cathedral of San Domingo, Hispaniola (Haiti). When that island was ceded to the French in 1795, a transfer was again made, to the cathedral of Havana, and at last, after Spain's loss of Cuba in 1898, the bones of father and son were taken back to Seville and placed in the cathedral there.

Columbus literature, already very voluminous, was more than doubled during the celebration of the four hundredth anniversary of his discovery of America in 1892. The chief source for information about him was for many years Navarrete's great collection of documents, published at Madrid between 1825 and 1837. This has been in a measure supplanted by a monumental work published by the Italian government, *Scritti di Colombo* (Rome, 1892). The standard English version of the *Letters* is Major's translation in the Hakluyt Society volumes for 1847 and 1870, supplemented by Markham's translation of the *Journal* in 1843. There is a convenient edition of the *Letters* edited by W. C. Ford (New York, 1892). The great critical study of Columbus' life and family is by Harrisse, in 2 vols. (Paris, 1884), the results of which were presented in English by Winsor (Boston, 1892). Later works are those of Markham (London, 1893), Adams (New York, 1892), Thacher (ib., 1903–04); Ober (ib., 1906), and especially the following works by Henry Vignaud, the distinguished counselor of the United States Embassy at Paris, which must be used to supplement and correct the great work of Harrisse previously mentioned: *Toscanelli and Columbus* (London, 1902); *Critical Study of the Various Dates Assigned to the Birth of Columbus* (ib., 1903); "Proof that Columbus was Born in 1451," in *American Historical Review* (Jan., 1907); *Etudes critiques sur la vie de Colomb avant ses découvertes* (Paris, 1905); *Histoire critique de la grande entreprise de Christophe Colomb . . . 1476–1493* (2 vols., Paris, 1911).

COLUMBUS (Colón), Diego (in It., *Giacomo*) (c. 1468–?1515). The youngest brother of Christopher Columbus. He was born probably at Genoa, and upon the news of his brother's great discovery came to Spain. He accompanied Christopher on his second voyage and late in 1494 was at the head of a commission intrusted with the government of Española in the absence of the Admiral. In 1496 he went to Spain to defend his brother against the charges submitted by some of the unruly members of the colony. He returned to Española, but fell into disgrace and was sent in chains to Spain in the year 1500. He is thought to have entered the Church a number of years before his death.

COLUMBUS (Colón), Diego (1480–1526). Eldest son of Christopher Columbus. He was born probably at Lisbon and came in 1484 to Spain with his father, who left him for some time with his friends at the convent of La Rábida, while he himself went to seek aid at the court. In 1494 he became page to the Crown Prince, Juan, and after the latter's death in 1497 he was admitted into the household of Queen Isabella, where he remained till 1504. After the death of his father he received the title of Admiral of the Indies, but was refused the viceroyalty which he claimed as his paternal right. In 1508 he married a daughter of the house of Alba, and through her influence succeeded in being made Governor of the Indies. In 1509 he arrived at Española to take possession of his office. He never desisted in his claim to the viceroyalty and to a share of the revenues from the New World due him, and in 1520 finally won his case. He was recalled, however, from his government in 1523, and though he made his peace again with the court, did not return to the New World. He died at Montalbán in 1526. His son Luís (c. 1520–72), born at Santo Domingo, received the title of Admiral of the Indies in 1529. He finally abandoned all claims of the family to the viceroyalty and received in compensation an estate in Jamaica and one near Veragua, with the titles of Duke of Veragua and Marquis of Jamaica. In 1563 he was banished on account of his dissolute life to Orán, where he died. With Diego Colón (died 1578), a nephew of Luís and a great-grandson of Christopher, the male line of the great Admiral became extinct. The present dukes of Veragua trace their descent from a sister of the last Diego.

COLUMBUS, Ferdinand (Fernando Colón) (1488–1539). A natural son of Christopher Columbus by Beatriz Enríquez de Arana, of Córdoba. In 1498 he became page to Queen Isabella. He accompanied his father on his last voyage to the New World, and in 1509 he sailed for Española with his brother Diego, who had been made Governor of the Indies. Returning to Spain, he settled down as a cosmographer and writer on navigation. He traveled extensively in Italy, the Netherlands, Germany, and France, and in 1522 visited England. Two years later he was a member of the board of arbitration selected to decide on the conflicting claims of Spain and Portugal to the Moluccа Islands. His political career was an active one and mainly in line with his profession as geographer. Two years before his death he founded a school of mathematics and education at Seville. His library of more than 12,000 volumes he left to the chapter of the cathedral at Seville. Ferdinand is best known as the probable author of a life of his father, upon which all subsequent biographies of Christopher Columbus have been based. We possess this work only in the form of the Italian translation published at Venice in 1571, the original having been lost. Ferdinand's claim to the authorship of this biography has been denied by eminent authorities and just as warmly defended; the question is still a mooted one.

COLUMBUS BARRACKS. A United States military post established in 1863 and originally an arsenal. The reservation embraces 77 acres

and is one mile from Columbus, Ohio, which is the nearest railroad station. It is an important recruiting depot for the United States army and contains quarters for 25 officers and 8 companies of infantry.

COLUM-CILLE. See COLUMBA, SAINT.

COL'UMEL'LA (Lat., dim. of *columna*, column). A descriptive term employed in several groups of plants, but especially in mosses and molds. In the mosses the columella is a central axis of sterile tissue extending through the capsule; while in the molds it is the bulging wall at the base of the sporangium, which extends more or less into the cavity of the sporangium.

COLUMELLA, LUCIUS JUNIUS MODERATUS. The most learned of Roman writers on practical agriculture. He was born at Gades (Cadiz), in Spain, and flourished about the middle of the first century. For some time he resided in Syria, but lived chiefly at Rome, and died, most probably, at Tarentum. His great work, *De Re Rustica*, in 12 books—the tenth, *On Gardening*, is in dactylic hexameters—is addressed to one Publius Silvinus and treats of arable and pasture lands, culture of trees, fruits, vegetables, grain, vines, olives, etc., care of domestic animals, birds, and bees, respective duties of masters and servants, and the like. A supplementary treatise relates to trees. This ancient *Book of the Farm* is written in good Latin, and the information is copious, though in some points of questionable accuracy. The best complete edition of Columella is by Schneider, in *Scriptores Rei Rusticæ* (Leipzig, 1784-97); for text of books x and xi, see Lundstrom (ib., 1903, 1907). Consult Barbaret, *De Columellæ Vita et Scriptis* (Nancy, 1888); Becher, *De Columellæ Vita et Scriptis* (Leipzig, 1897).

COLUMN (from Lat. *columna*, column, connected with AS. *holm*, island). In architecture, a vertical support, usually round or polygonal, and having a height much greater than its diameter. A complete or typical column consists of a base (q.v.), shaft, and capital (q.v.). The capital forms at once an ornamental topping for the column and an intermediate member between the vertical lines of the shaft and the horizontal architrave (q.v.) or the impost and spreading spandrel (q.v.) of the arcade, which rests upon it; while the base in like manner mediates between the shaft and the horizontal surface in which the column stands. The shaft is therefore the essential part of the column; for some columns lack bases, as the Greek Doric, and some are without capitals, as in certain late Gothic examples. The shaft is commonly round in section, but its section may be any regular geometrical figure. A square or rectangular column is, however, generally called a *pier;* and whenever the shaft of a vertical support is very massive, or is built up of masonry of several pieces of stone in each course, it is generally called a pier rather than a column. If, on the other hand, each course or horizontal division is composed of a single stone, called a *drum*, the support is termed a column rather than a pier. But this distinction is not always observed, for the vast pillars of masonry which flank the central aisle of the Hypostyle Hall at Karnak, though not composed of drums, are universally called columns. When the shaft is of complex plan, having a central core surrounded by a number of subordinate shafts, as in Romanesque and Gothic architecture, the whole is called a clustered column or, more commonly, a clustered pier. The word *pillar* is frequently but loosely used in the senses both of column and pier; for its meaning and proper use, see that term. A column may be of any material—stone, marble, brick, wood, or metal; but ordinary squared or rough supports of timber are properly called *posts*. Columns of stone or marble are *monolithic* when the shaft is a single piece; only in the rarest instances are base, shaft, and column hewn all of one piece. Columns carry the superstructure by means either of horizontal beams or lintels, called architraves (q.v.), or arches. In the latter case a block, called an impost block or supercapital, is sometimes interposed between the capital and the springing or impost of the arch, as in Byzantine architecture; sometimes the interposed feature comprises a square section of an entire entablature—architrave, frieze, and cornice—as in many late Roman examples. In both Greek and Roman architecture, and the modern styles derived from them, certain forms of column are uniformly combined with particular forms of entablature, according to more or less well-defined rules; such a specific combination is called an *order* (see ORDERS OF ARCHITECTURE); but no such uniform combinations are found in Egyptian, Oriental, or mediæval architecture. Various types of column and their characteristic capitals are shown in the accompanying plate. Some of the special forms, uses, and types of columns, including the metal supports in modern steel construction, are briefly mentioned and explained at the end of this article.

Historical. In the earliest Chaldean architecture the column seems to have played no part whatever; even in the later Assyrian palaces it was used only in a subordinate function, for small secondary supports, probably of wood, as shown in the relief pictures. It was the Egyptians who, lacking good timber but having abundant stone, first developed columnar types of architecture, placing massive columns in rows spaced as far apart as was practicable to span with stone lintels. While they used one undeviating type of cornice (q.v.), the forms and proportions of the columns varied greatly, both as to the shaft, which was round, quatrefoiled, or clustered in section, and the capital, of which the most important types were the lotus bud (or papyrus bud), either simple or clustered; the bell-shaped or campaniform, simple or multifoiled; the palmiform, and the Hathor-headed, with four masks of Hathor surmounted by a model of a shrine. A simple round disk was the only form of base used. The shaft generally swelled from the base and contracted gradually upward, and at the top was decorated by five or six bands under the capital. The round shafts were often covered with incised pictures and hieroglyphics. The great central columns of the Hypostyle Hall at Karnak (q.v.) are 75 feet high and 15 feet in diameter (see ARCHITECTURE, Plate of Temple of Karnak). The Egyptians employed columns chiefly as interior supports; the Greeks used them both as interior and exterior supports, and developed in the Doric, Ionic, and Corinthian orders types of column and entablature, and of architectural effect, which, further elaborated by the Romans, have furnished models and suggestions for the architecture of subsequent ages. The earliest Greek columns, those of Crete, Mycenæ, and

Tiryns, seem to have been derived from wooden originals in tree trunks set up with the small end down, as they all taper downward. They were perhaps often of wood plated or sheathed with bronze; but a few stone columns have been found, among them those of the doorway of the Treasury of Atreus at Mycenæ, now restored and reërected in the British Museum.

The columns of the post-Homeric or historic Greek architecture were entirely different from the early types just described. For over 600 years the Greeks employed the Doric column with but slight variations, the earliest known examples, at Corinth, dating from perhaps 650 B.C. The Doric column had no base; its sturdy shaft, tapering slightly upward in a delicate convex curve (entasis) to the capital, had 16 or 20 shallow vertical channelings meeting in sharp edges or *arrises*. The capital consisted mainly of a spreading convex-profiled circular molding (echinus) supporting a plain square abacus (q.v.). The shaft was composed of drums, and the height of the column varied from less than five times the lower diameter in early examples to more than seven diameters in late examples. Those of the Parthenon are six feet in diameter at the foot, and 34.23 feet high; they are spaced somewhat over two diameters on centres. The great massiveness of the earliest examples counts against the theory that they were derived from wooden prototypes; but their origin is as yet undetermined. In the sixth century B.C. the Ionic type, indubitably derived from wooden prototypes, was introduced into European Greece from Asia, and by its more slender proportions and greater richness of detail won favor for certain classes of buildings of moderate size. This type was from 7½ to 9½ diameters in height, rising from a richly molded circular base to a capital with spiral volutes connected by a band, above a carved echinus. In Asia Minor this order was employed for temples of colossal size, e.g., that of Artemis (Diana) at Ephesus. In the fourth century the Corinthian capital, of ornate design with leaves and volutes around a bell-shaped core, was introduced as a variant of the Ionic, the column being otherwise of the slenderest Ionic type. Later the Romans developed an entirely distinct Corinthian order.

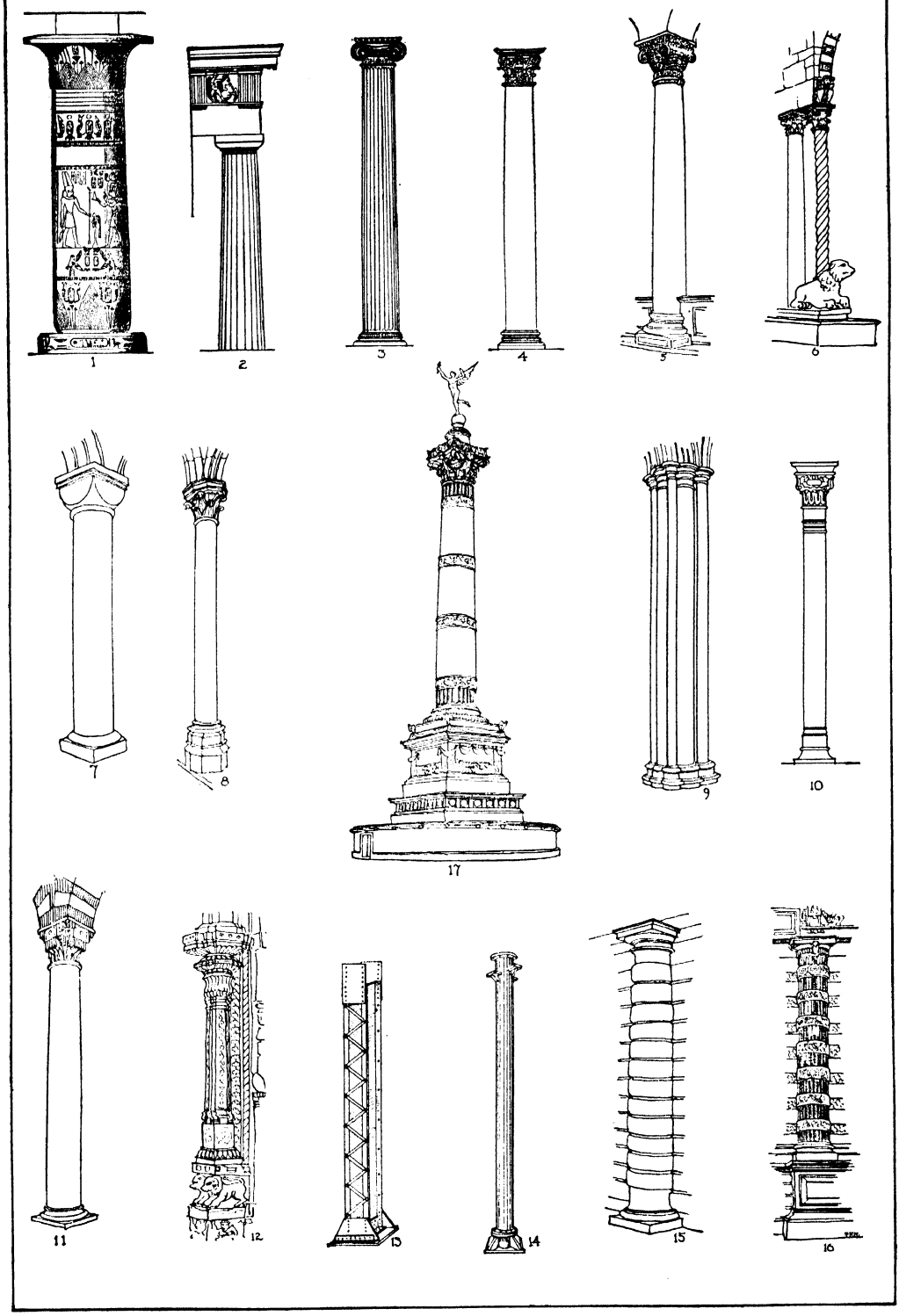
These various forms of column were used by the Greeks chiefly for exterior colonnades; but in the larger temples and other structures they appear also as interior supports, sometimes in two stories. In the temple of Apollo at Bassæ and in the Propylæa at Athens the interior columns were Ionic; those in the Tholos at Epidaurus were Corinthian; while in all three the exterior columns were Doric. In the unfinished temple of Zeus at Agrigentum, and in the tiny choragic monument of Lysicrates at Athens, engaged columns, i.e., columns partly sunk, as it were, in the walls, were used on the exterior.

The Romans developed the column into an architectural feature of far greater flexibility, variety, and splendor than the Greeks. Their Tuscan and Doric columns were variants of earlier Etruscan types; the Greek Ionic they adopted with little change; the Greek Corinthian they elaborated into a distinct order with its own entablature; and to these four they added the Composite, a variant of the Corinthian. While the proportions of these columns varied less widely than the Greek, it is a mistake to assert that they were uniform at any one time, or regulated by a rigid canon. Moreover the Romans greatly increased the variety of their columnar architecture by employing monolithic shafts of polished marble, porphyry, and granite; by superposing the orders in many-storied buildings; by the introduction of pilasters; by setting columns on pedestals; by coupling columns with pilasters; and by the use of engaged columns in combination with arcaded structures. In vaulted buildings the vaults were made to spring from huge columns surmounted by blocks of a complete entablature; and as purely decorative features small columns and pilasters were employed to flank niches and doors, and larger ones to break up and adorn the surfaces of blank walls, the piers of arches of triumph, and the like. Columns of great size, veritable towers with interior stairs and exterior sculpture, were set up as memorials (see ANTONINE COLUMN; TRAJAN'S COLUMN). In Pompeii columns were frequently built of rubble or brick, and heavily covered with stucco molded into the forms of the various orders and painted in bright colors (see POMPEII). In Roman work generally, the column really or apparently supports an entablature. Only in late work, as at Spalato (q.v.) and in Syria, were columns used as supports for arcades. This use of the column, however, became general in early Christian architecture, in the interiors of basilicas with aisles (see BASILICA), though in some examples the columns carry horizontal entablatures. The Byzantine architects used the column as a support for arches and vaults, employing monolithic shafts like the Romans, but devising wholly new types of carved, basket-like capitals, often surmounted by impost blocks. They never used the engaged column.

In Italy, through the early Middle Ages, the column and pilaster of a semiclassic type never quite passed from use; but in the early Lombard buildings the clustered pier, with four columns or shafts grouped around a central core, made its appearance as early as the eleventh century (San Ambrogio, Milan); and somewhat later the nook shaft or jamb column appeared in the splayed doorways of churches. These types of support spread through France and through Germany, especially the Rhine provinces, and by way of Normandy into England and northern Europe. Out of the Romanesque clustered pier was developed all the splendid clustered shafting of Gothic interiors. The slender shafts had no entasis or diminution; they were sometimes attached and sometimes free, and the capitals, often remotely reminiscent of the Corinthian type, were richly

1. Egyptian lotus-flower column.
2. Greek Doric column from the Parthenon at Athens.
3. Greek Ionic column from the Erechtheum at Athens.
4. Roman Corinthian column from the Pantheon, Rome.
5. Byzantine column from St. Sophia, Constantinople.
6. Italian Romanesque column, Verona Cathedral.
7. English Norman column, Ely Cathedral.
8. French Gothic column, church of Notre Dame, Chalons-sur-Marne.
9. English Gothic column, Salisbury Cathedral.
10. Moorish column, Alhambra, Granada.
11. Turkish column, mosque of Suleiman, Constantinople.
12. Hindu column, porch at Peroor, India.
13. Lattice and channel steel column with base.
14. Cast-iron column with base.
15. Rusticated Doric column, Palais du Luxembourg, Paris.
16. Banded Doric column, Palais du Louvre, Paris.
17. Memorial column, Colonne de La Bastille, Paris.

COLUMNS



TYPICAL COLUMNS

FOR NAMES AND DESCRIPTIONS SEE TEXT

carved with foliage, sometimes with grotesques. Gothic shafts were always smooth; but those of the Romanesque period were sometimes richly carved. Round piers, like very massive columns, continued to be used in place of, or in connection with, clustered columns in France and Belgium (and for a while in England), until the decline of Gothic art. Meanwhile the Moslem world had adopted the simple column, with capitals of various types (see MOHAMMEDAN ART). In China and Japan the column seldom appears, its place being taken in interiors by wooden posts; but in India the Jaina and Brahman styles, as well as the Indo-Moslem, produced an infinite variety of columns, more often polygonal than round, and carved into endlessly varied decorative forms.

The Renaissance, first in Italy, then in France, and finally throughout Europe, revived all the Roman forms of columns, devised many charming variations of the Corinthian type of capital, invented new types of shaft—rusticated, banded, and sculptured, and new arrangements of columns, especially by coupling them. The colonnades in front of St. Peter's at Rome, and in Paris those of the Louvre and of the Place de la Concorde, are among the most magnificent of all examples of columnar architecture. In modern practice the Greek as well as the Roman and Renaissance types are in use, and in the United States especially the columnar portico has been used with grandiose effect in a great number of public buildings.

A column having beveled or grooved joints between its drums is a *rusticated* column; one with alternate or occasional drums of larger diameter than the rest is a *banded* column; one projecting from or partly embedded in a wall is an *engaged* column. A column set as a mullion in an opening in the centre of the thickness of the wall is a *midwall* column. A *rostral* column is a memorial or decorative column adorned with symbolic ships' prows projecting from its shafts; *cantoned* columns are those attached to the corners of a rectangular pier. Metal columns may be of cast iron, or "built up" of bars, beams, and plates of wrought iron or steel, and are known by various names according to their form, e.g., *Z-bar* when composed of double-angle irons resembling the letter Z; *box* when built up of two or more channel bars and two plates; H-columns, I-columns, etc., when of sections resembling those letters. A Phœnix column is a circular steel column built up of flanged bars of segmental section. (See FIREPROOF CONSTRUCTION.) The bibliography of columns is practically identical with that of architecture (q.v.); see that for ORDERS OF ARCHITECTURE; and also consult Guadet, *Théorie de l'Architecture* (Paris, 1904) and Longfellow, *The Column and the Arch* (New York, 1899).

COL'UMN. As defined by the *United States Infantry Drill Regulations*, a military formation in which the elements are placed one behind another, whether these elements are files, squads, platoons, or larger bodies. When a regiment is on the march, and each company marching in column of squads, it is said to be "in column of route." The same formation may be adopted by any number of troops in a command. When the science of war was in its infancy, dense column formations were the usual order of battle, much reliance being placed upon it by every European nation except England, who invariably preferred its opposite, the "line" formation. See TACTICS, MILITARY; MARCHING; ADVANCE GUARD; ARMY ORGANIZATION; REAR GUARD. The composition and operation of a column of ships in naval warfare or manœuvres will be found treated under TACTICS, NAVAL.

COLUM'NA ROSTRA'TA. A column set up in the Roman Forum to commemorate the naval victory of Gaius Duilius (q.v.) over the Carthaginians in 260 B.C. It was of marble, adorned with the prows of the captured ships; hence the name. The column having been destroyed by lightning, a new column was erected by Claudius, with an inscription found in the Forum in 1566 and now preserved in the palace of the Conservatori. Consult *Corpus Inscriptionum Latinarum*, vol. i (2d ed., 1893), and Allen, *Remnants of Early Latin*, pp. 67–68 (Boston, 1884).

COLUMN OF JULY. See JULY, COLUMN OF.

COLUMN OF MAR'CUS AURE'LIUS. See ANTONINE COLUMN.

COLUMN OF PHO'CAS. See PHOCAS, COLUMN OF.

COLUMN OF SAINT MARK. See VENICE.

COLUMN OF TRAJAN. See TRAJAN'S COLUMN.

COLUMNS OF HER'CULES. See HERCULES, PILLARS OF.

COLUMN VENDÔME, väN'dôm'. See VENDÔME, PLACE.

COLURE, kô-lūr' (Gk. *κόλος, kolos*, docked + *οὐρά, oura*, tail). One of the two great circles of the celestial sphere drawn through the celestial pole, and in one case the equinoxes, in the other the solstices. The colures divide both the ecliptic and the celestial equator into four equal parts. The solstitial colure also passes through the pole of the ecliptic.

COLVILLE, kōl'vĭl (from the town of Colville, Wash.). A former important Salishan people, calling themselves Shwoyelphi, or Senijextee, originally occupying the country on Columbia River about Colville and Kettle rivers, northeastern Washington. The great salmon-fishing resort of Kettle Falls was within their territory, and here, in 1846, was established the Jesuit mission of St. Paul, through the influence of which nearly all the upper Columbia tribes are now Christianized. They were put upon a reservation (Colville) in 1872 and numbered 785 in 1910. See SALISHAN STOCK.

COLVIN, kŏl'vĭn, SIR SIDNEY (1845–). An English critic of art and books, born at Norwood, Surrey. He graduated in 1867 at Trinity College, Cambridge, was elected a fellow of the college in 1868, and, having become Slade professor of fine arts at Cambridge in 1873, held that post by successive reëlections until 1885. In 1876–84 he was also director of the Fitzwilliam Museum of the university. He was keeper of prints and drawings in the British Museum from 1884 to 1912. His contributions to periodicals on the history and criticism of literature, and more largely of the fine arts, are numerous and valuable. He was knighted in 1911. His published works include the volumes on *Walter Savage Landor* (1881) and *John Keats* (1887) in the "English Men of Letters Series"; *A Florentine Picture-*

Chronicle (1898); *The Early History of Engraving in England* (1905); editions of *Selections from the Writings of Walter Savage Landor* (1882); of the *Letters of Keats* (1887) in the "Golden Treasury Series," and of the *Papers of Fleeming Jenkin* (1887; with J. A. Ewing); *Selected Drawings from Old Masters* (1903–10); *Early Engraving and Engravers in England* (1906); *Letters of Robert Louis Stevenson* (1911). His labors in connection with the preparation of the standard Edinburgh edition (27 vols., 1894–98) of the works, and of the edition of the collected *Letters* (2 vols., London, 1900; preceded in 1895 by *Vailima Letters*) of his friend, Robert Louis Stevenson, made him an authority on that author. He also wrote the sketch of Stevenson for the *Dictionary of National Biography* (vol. liv), and was to have written the authoritative *Life*, intended for publication with the *Letters*, but was obliged to relinquish the task to Graham Balfour.

COL'VOCORESSES, GEORGE PARTRIDGE (1847–). An American naval officer, born at Norwich, Vt. After serving two years in the Civil War on the ships *Supply* and *Saratoga*, he attended the United States Naval Academy, where he graduated in 1869. He was promoted through the various grades, becoming captain in 1905 and retiring as rear admiral in 1907. During the Spanish-American War he took part in the battle of Manila Bay. He was instructor at the Naval Academy in 1886–90 and in 1893–96, and was commandant of midshipmen in 1905–07.

COL'WELL, STEPHEN (1800–72). An American author and philanthropist, born in Brooke Co., West Va. He graduated at Jefferson College, Pa., in 1819; was admitted to the bar of Virginia in 1821; and practiced in Pittsburgh until 1831, when he engaged in the iron business in Philadelphia and began writing for the press, particularly on questions of politics and social science. He gathered a large library, which he left to the University of Pennsylvania, where he also endowed a chair in social science. During the Civil War he was an active supporter of the Union and at its close was appointed a commissioner to revise the internal-revenue system. Besides contributions to commercial and financial periodicals, he published: *Politics for American Christians* (1852); *Position of Christianity in the United States in its Relation with our Political System and Religious Instruction in the Public Schools* (1855); *Effects of Disunion on Slavery* (1856); *The Ways and Means of Commercial Payment* (1858).

CO'LY. See MOUSE BIRD.

COLYN. See COLINS.

COL'ZA, or COLESEED. See RAPE.

CO'MA (Neo-Lat., from Gk. *κῶμα, kōma*, deep sleep, from *κοιμᾶν, koiman*, to put to sleep, from *κεῖσθαι, keisthai*, to lie; connected with Lat. *quies*, rest). A state of profound insensibility differing from natural sleep in that the patient cannot be aroused from the stupor. The patient's eyes are closed, his pupils are either large or small, his face is generally flushed and the conjunctivæ red, the breathing deep, labored, and stertorous. The different varieties of coma which the physician is called upon to distinguish are as follows: Coma due to drugs, e.g., alcohol, opium, belladonna, chloral; poisoning from illuminating gas, ptomaines, uremia, and diabetes; unconsciousness from nervous diseases, such as epilepsy and hysteria; or from brain lesions, as apoplexy, tumors or abscess of the brain, concussion, meningitis. There remain also to be mentioned voluntary coma (feigning, malingering) and transient coma, or syncope. In the coma from opium or morphine the patient should be aroused if possible and kept walking and awake by various means; but in coma from all other causes he should be kept absolutely quiet in bed. Therefore it is very necessary to know exactly what trouble must be treated, and no layman can judge of the proper remedial measures. The coma from alcoholic intoxication is so frequent and well known that very often the coma of serious conditions is mistaken for mere drunkenness.

Coma Vigil. A condition of continuous sleeplessness, associated with partial unconsciousness, occurring towards the end of a severe attack of diseases, such as typhus or typhoid fever, or delirium tremens.

CO'MA BER'ENI'CES (Lat., Berenice's hair). A small northern constellation said to have been named in honor of Berenice, the wife of Ptolemy Euergetes, but first delimited by Tycho Brahe. It lies to the south of the tail of the Great Bear and very near the equinoctial colure (q.v.). It consists of a small cluster of stars which has been the subject of careful measurement with the heliometer by Chase at the Yale Observatory, and photographically by Kretz, at Columbia University, New York. See CONON OF SAMOS.

COMACCHIO, kō-mäk'kyō (Lat. *Comaculum*). A town in the Valli di Commachio, Province of Ferrara, in northeast Italy, situated on the southernmost of the lagoons of the Po, 3 miles from the Adriatic (Map: Italy, G 3). It is built on 13 islands that are connected by numerous bridges, and the lagoon communicates with the little port of Magnavacca, on the Adriatic. It is the seat of a bishopric, has ancient walls and an old cathedral. It was formerly an important fortress. The majority of the inhabitants are engaged in fishing for eels for the market and in the manufacture of salt. Pop. (commune), 1881, 9974; 1901, 10,877, 1911, 12,052.

CO'MAN, KATHARINE (1857–1915). An American economist and educator, born in Newark, Ohio. She graduated at the University of Michigan in 1880, and was professor of history (1883–1900) and then of economics at Wellesley College. Her writings, of which the most important are on economic history, include: *The Growth of the English Nation* (1894); *History of England* (1899); *English History as told by English Poets* (1902; with Katharine Lee Bates); *Industrial History of the United States* (1905, revised 1911); *Economic Beginnings of the Far West* (1912).

COMA'NA (Lat., from Gk. Κόμανα, *Komana*). 1. COMANA OF CAPPADOCIA, an ancient city, situated in a deep valley of the Anti-Taurus Range, through which the river Sarus flows. It is probably identical with the Kumani of Tiglathpileser I (c.1140–1105 B.C.) and the Kammanu of Sargon II (722–705 B.C.). Comana was celebrated as the place where the rites of the goddess Ma (the Greek Enyo, or Artemis, and the Roman Bellona) were celebrated with much solemnity and great magnificence, in a spacious and sumptuous temple, to which the city was

scarcely more than an appendage. It was governed by the chief priest, who took rank next to the King. In Strabo's time more than 6000 persons are said to have been engaged in the temple affairs. The festivals attracted large gatherings. It has been suggested by Th. Reinach (*Mithridate Eupator*, 1890, p. 242) that the early development of this cult was to some extent influenced by the Cimmerians (q.v.) in the seventh century B.C. John Chrysostom died in Comana on his way from Cucusus to Pityus on the Euxine, whither he had been banished. 2. COMANA IN PONTUS, an ancient city of Asia Minor, on the river Iris, the modern Tocat-su. It was an important commercial city, and the seat of the worship of the goddess of the moon, whose cult was carried on with ceremonies analogous to those employed in the Cappadocian Comana (see above). Its ruins are still to be seen near the village of Gumenek.

COMANCHE, kō-măn'chē *or* kō-măn'chā (of unknown signification, first applied to the tribe by the Spanish Mexicans), an important tribe of Shoshonean stock, formerly ranging jointly with the Kiowa (q.v.), along the southern plains from the Arkansas River to central Texas, and extending their forays far down into Mexico. Up to the surrender of the last hostile band, in 1875, they were the constant scourge of the Mexican and Texan frontier. They are a southern offshoot of the Shoshoni proper, the language of the two tribes being the same. They are singularly deficient in religious ceremonials. They now number 1171, in western Oklahoma, their reservation having been thrown open to settlement in 1901. Consult *Handbook of American Indians* (Washington, 1907).

COMANCHE. A city and the county seat of Comanche Co., Tex., 112 miles southwest of Fort Worth, on the Fort Worth and Rio Grande and the St. Louis and Southwestern railroads (Map: Texas, C 4). It is in an agricultural region and has stockyards, brickworks, cotton gins and other establishments connected with the cotton industry. Comanche was settled in 1857 and is governed under a charter of 1876 which provides for a mayor, elected biennially, and a unicameral council. The water works are owned by the city. Pop., 1900, 2070; 1910, 2756.

COMAN'CHEAN SERIES. A division of the Cretaceous system of rocks, including all of the Lower Cretaceous beds as developed in the southern interior section of the United States and the adjoining parts of Mexico. The series is made up of three subordinate stages (*a*) Trinity, (*b*) Fredericksburg, and (*c*) Washita; the first, or Trinity, stage largely consists of sands, but the later ones are largely limestone or chalk. The beds are exposed over an extensive area in Texas, Oklahoma, and Mexico, reaching a thickness of 1000 feet or more in Texas and over 10,000 feet in Mexico. They contain lignitic coal and some bitumen. The Comanchean is given the rank of a system by some American geologists who employ the name to designate all of the strata hitherto classed as Lower Cretaceous; the Cretaceous system would then include only the part that has usually been designated as Upper Cretaceous. Consult Chamberlin and Salisbury, *Geology*, vol. iii (New York, 1907). See CRETACEOUS SYSTEM.

COMAYAGUA, kō'mä-yä'gwä. The capital of the department of the same name, Honduras, near the Río Ulua, 37 miles northwest of Tegucigalpa (Map: Central America, D 3). It is situated in a fertile valley, but has little trade. It is an episcopal see, and the cathedral, dating from the early eighteenth century, is the most notable building. Pop., about 3000. Comayagua appears first in history, under the name "Valladolid la Nueva," about the middle of the sixteenth century, and Indian relics found in the vicinity testify to its antiquity. Until 1880 it was the capital of the republic.

COMB (AS. *camb*, Icel. *kambr*. OHG. *chamb*, Ger. *Kamm*, comb; connected with Gk. *γόμφος*, *gomphos*, peg, OChurch Slav. *zadŭ*, Skt. *jambha*, tooth). Combs seem to have been used by the ancients rather for adjusting than for fastening the hair, the pin, or bodkin (*acus*), having chiefly been employed for the latter purpose. Both the Greek and Roman combs were generally made of boxwood, obtained from the shores of the Euxine; but later, ivory combs, which had long been used by the Egyptians, came into general use among the Romans. The precious metals were also used for this purpose, but this was probably rarer in ancient than in modern and mediæval times, from the circumstance of the comb not having then been used as an ornamental fastening. Of the early use of gold combs in Great Britain we have a reminder in the well-known ballad of "Sir Patrick Spens":

> "O lang, lang may their ladyes sit,
> Wi' their gowd kames in their hair."

Combs have been found in Anglo-Saxon graves of both men and women. In early times the comb had a place in the church service. Careful ritualistic directions have been found for combing the abbot's hair in the sacristy before vespers and other services. In the tombs of the martyrs in the catacombs combs of ivory and boxwood have been found, which testify to this ancient custom of the priests arranging their hair before the altar.

An ancient Irish long rack comb is in the museum of the Royal Irish Academy. The sides are hogbacked, and between them are set the pectinated portions, varying in breadth from half an inch to an inch and a quarter, according to the size of the bone out of which they were cut. The whole is fastened together with brass pins riveted. By this contrivance any damaged portion could easily be replaced.

Modern combs are made with automatic machinery from tortoise shell, ivory, horn, wood, bone, metal, india rubber, and celluloid. The material is first made into plates of the size, shape, and thickness of the comb, and then the teeth are cut. In the case of horn, a material which is becoming rarer, the horn must be cleaned and slit, heated and flattened, and sawed into strips. The edges and ends are then trimmed, and the blanks are finished; the last stage in this preliminary process being hydraulic pressing. The old method of cutting the teeth was by the *stadda*, or double saw, which had two blades of steel set parallel to each other, with a space between them equal to the thickness of the intended tooth. Combs with 50 or 60 teeth to the inch may be cut in this manner. The teeth are then thinned, smoothed, and finished by means of thin, wedge-shaped files.

By the older process of cutting, above described, the material corresponding to the spaces between the teeth is of course wasted; by the method of parting this is made available to form the teeth of a second comb. The plate of horn, tortoise shell, etc., in a modern comb-cutting machine is cut through with plungers

carrying at their lower ends cutters which cut the teeth of two combs at a time. The essential features of the cutter consist of two thin chisels inclined to each other, which represent the edges; between these, and connecting the ends, is a small cross chisel. When this compound cutter descends with sufficient force upon the plate, it will cut one of the teeth. By simple machinery the table carrying the plate is made to advance a distance equal to the thickness of one tooth while the cutter is rising, and thus the successive cuts are made. A slight pull is now sufficient to part the plate into two combs, the teeth of which only require filing and finishing. India-rubber combs are manufactured by pressing the caoutchouc to the required form in molds and "vulcanizing" or combining it with sulphur afterward. By this means a high degree of hardness can be obtained. Celluloid combs may be also molded, but a process similar to that used with horn is preferable. In making celluloid combs the teeth may be either sawed or else the combs may be twinned or parted as described above, or formed with other automatic machinery in which the entire process from the blanks may be carried on to the finishing stage. In 1905 combs to the value of $2,769,380 were produced in the United States by 42 establishments, with a capital of $1,112,260, giving employment to 1806 wage earners. For the manufacture of horn combs and the machinery used therein, consult Viall, "The Manufacture of Horn Combs," *American Machinist*, vol. xxxv, p. 740 (New York, 1911). For the manufacture of celluloid combs, consult Masselon, Roberts, and Cillard, *Celluloid*, Eng. trans. by Hodgson (London, 1912).

COMB, or **COOMB.** An old British corn measure, containing four bushels. In many localities hollows or valleys among hills are called "combs," or "coombs."

COMBA, kōm'bȧ, EMILIO (1839–1904). An Italian writer, born at San Germano Chisone. As professor at the Istituto Valdese at Florence, he founded in 1873 the review entitled *Rivista Cristiana*, somewhat polemical in nature, devoted to a discussion of religious topics. The history of religious reform in Italy is well described in the interesting works entitled *Introduzione alla storia della riforma in Italia* (1881) *and I nostri protestanti* (1895–97). The *Storia dei Valdesi* (new ed., 1901) was translated into English by T. E. Comba (London, 1889).

COMBARELLES, CAVERN OF. See PALEOLITHIC PERIOD.

COM'BAT (Fr., from *combattre*, to fight, from Lat. *com-*, together + ML. *battere*, to fight, from Lat. *batuere*, to beat), SINGLE. Among the early Norsemen a careful distinction was made between the ordinary single combat, or *einvígi*, and the *hólm-ganga*, or island duel. The former was unencumbered with rules and traditions and was a simple fight between two opponents. The other, which received its name from the fact that it was always held on the *hólm*, or island, generally of a river, was accompanied by very elaborate rites and rules and could be engaged in only under certain circumstances, to be determined by the authorities. It was regarded as a sort of court of final appeal, and at the meeting of every Parliament, or *Thing*, a place for the holding of these official duels was set aside. Many old Norse warriors were famous as fighters of hólms, some even receiving nicknames from this circumstance. The hólm was abolished by the Icelandic Parliament, about 1006, probably as the result of the recent establishment of a new court of appeal, which made it unnecessary. The hólm continued in Norway for a few years longer. Some connection may exist between the hólm and the Norman tournaments, and the modern duel, with its formal procedure, represents the same idea in an unofficial form. Consult Baigt, *Der gerichtliche Zweikampf nach seinem Ursprung und in Rolandslied in romanische Forschungen*, pp. 436–498 (1890), and Below, *Der Ursprung des Duells* (Freiburg, 1898).

COMBE, kōm, GEORGE (1788–1858). A Scottish phrenologist, born in Edinburgh. He entered the legal profession, became a writer to the signet in 1812, and continued to practice until 1837, when he resolved to devote himself to scientific pursuits. He published his *Essays on Phrenology* in 1819 (renamed in later editions *System of Phrenology*), and in 1828 *The Constitution of Man Considered in Relation to External Objects*. Combe contributed largely to the *Phrenological Journal* (20 vols., 1824–47). Besides the works mentioned, he wrote on ethics, education, politics, economics, and theology. He also traveled in America and Germany, and published *Notes on the United States of North America* (3 vols., 1841). In his day his writings were popular, but they have no importance now. For his *Life*, consult Gibbon (London, 1878).

COMBE, WILLIAM (1741–1823). An English author. He was born at Bristol and was educated at Eton and at Oxford, which he left without a degree. After rapidly spending a small fortune that had been left him, he settled in London as a law student and hack writer. In 1776 he published his "*Diaboliad*, a poem dedicated to the worst man in his Majesty's dominions." By his pen he earned a precarious living, and spent a good deal of his time in prison. He wrote upward of 200 biographical sketches, 70-odd sermons, many satires in doggerel, and an immense number of magazine articles. His most famous work, however, is *Three Tours of Dr. Syntax* (1812–21), written in verse, and illustrated by Rowlandson. It is a comic account, of still undiminished humorous appeal, of the adventures of a pedagogue. Consult Hotten, *The Three Tours*, edited with a bibliography (London, 1869).

COMBE CAPELLE SKELETON. See MAN, ANCIENT TYPES.

COM'BERMERE, STAPLETON COTTON, VISCOUNT (1773–1865). An English soldier. He was born at Llewenny Hall, Denbighshire, and, after serving in several campaigns in India and South Africa, joined the army in Spain, where he greatly distinguished himself, rising to the command of the entire cavalry of the allied forces. He was commander in chief of the army in Ireland from 1822 to 1825 and was then sent in the same capacity to India, where he remained for five years, during part of this time acting as Governor-General. In recognition of his distinguished services he received the title of viscount, and in 1855 was made field marshal. He had succeeded to the family baronetcy in 1809. He was constable of the Tower (1852) after Wellington. A few years after his death an equestrian statue by Marochetti was erected to his memory at Chester Castle. Consult *The Combermere Correspondence*, edited by his widow and W. W. Knollys (London, 1866).

COMBES, kôNb, FRANÇOIS (1816–90). A French scholar and historian, born at Alby. He became professor of history at the College of Pamiers in 1844, at the Collège Stanislas in Paris, 1848, at the Lycée Bonaparte in 1853, and in the Bordeaux faculty of letters in 1860. He published: *Histoire générale de la diplomatie européenne* (1854); *Histoire de la diplomatie slave et scandinave* (1856); *Histoire des invasions germaniques en France* (1873); *Lectures historiques à la Sorbonne et à l'Institut* (1884–85); and an edition of the French correspondence of John de Witt (1873).

COMBES, JUSTIN LOUIS EMILE (1833–). A French politician, born at Roquecourbe in the Department of Tarn. He at first studied for the priesthood, but later he decided to become a physician instead. After completing his medical course he settled down as a country doctor in the little town of Pons in the Department of Charente-Inférieure. His interest in politics sprang from his interest in public hygiene and education. He was elected mayor of Pons in 1875, then a member of the Conseil-Général of the department in 1879, finally a senator in 1885, an office which he still held in 1914. M. Combes became a prominent leader of the Radical Republican party and was given the portfolio of Minister of Education in the Bourgeois cabinet of 1895. In 1903 he succeeded Waldeck-Rousseau as Premier, himself taking the portfolio of the Interior. It was during the Combes ministry that the war on the church, which had been started by Waldeck-Rousseau, was carried on with unflinching firmness. The law against the religious orders was enforced with great severity, and over 500 teaching, preaching, and commercial orders were suppressed under the Combes régime. The Premier was relentless in his opposition to these associations, which he regarded as "pernicious instruments of that monstrous theocratic doctrine which is fatal to our whole social and political conception, of which the fundamental axiom is the absolute independence of the state of all dogma, and its recognized supremacy over every religious communion." During the Combes ministry steps were also taken which were to lead later to the separation of church and state. In spite of the fact that M. Combes was upheld by the Chamber in all his acts, he resigned in 1905 because of the intense bitterness which these acts aroused among the conservatives.

M. Combes is a latter-day Voltairean, with all of his master's hatred of clericalism in all its forms. To him the Catholic church appears as the sworn enemy of modern life and culture and particularly of the Republic of France. M. Combes is therefore a statesman of one idea, anti-clericalism, for he has taken deeply to heart Gambetta's famous injunction, *Le cléricalisme, voilà l'ennemi.* Personally he is what is called in France an "austere Republican," a man simple in his private life and absolutely rigid in his adherence to the principles of the French Revolution.

COM'BINA'TION. See PERMUTATION.

COMBINATION (ML. *combinatio*, from Lat. *combinare*, to combine, from *com-*, together + *bini*, two by two). In law, specifically the union of individuals or corporations for the promotion of their common business interests. When limited to this object, and kept free from fraud, violence, or like sinister methods, it does not fall under the ban of modern law. If it is resorted to, however, for the accomplishment of an unlawful end, it becomes a conspiracy (q.v.) and subjects its promoters to civil actions for damages as well as to criminal prosecution. Formerly combinations to raise or depress prices, as well as every form of combination in restraint of trade, were treated as conspiracies by English law.

Whether combinations by laborers to raise wages were conspiracies at common law is a question upon which the highest authorities in England differ. If not at common law, they were criminal conspiracies under a series of statutes beginning with 23 Edw. III in 1349 and closing with 40 Geo. III, c. 60, in 1800. A radical change in legislation on this topic in England began in 1825, and at present combinations of workingmen in labor organizations (q.v.) and similar associations are sanctioned by law, both in Great Britain and the United States, provided they are not accompanied by fraudulent, violent, or menacing conduct, or by boycotting or similar unlawful practices. See CONSPIRACY; BOYCOTT; INTIMIDATION; TRADE-UNIONS; STRIKE.

Combinations of skill and capital, within proper bounds, have always received legal recognition; such as the combinations effected in a partnership, joint-stock association, or corporation. At present the tendency to extend these combinations and to introduce new or modified forms is very marked. Trade-unions (q.v.) among workingmen, and trusts (q.v.) among capitalists, may serve as illustrations. The legislation relating to these forms of combination, as well as their economic and political bearings, will be dealt with under the appropriate titles.

COMBING. See CARDING.

COMBUSTION (Lat. *combustio*, a burning, from *comburere*, to burn, probably for **comurere*, but with *b* inserted on the analogy of *ambustus*, burned; less plausibly for **co-amb-urere*, to burn, from *com-*, together + amb, ambi, Gk. *ἀμφί*, *amphi*, around + *urere*, to burn), or BURNING. The process by which bodies combine with oxygen and are thus seemingly destroyed. The term is, in ordinary parlance, restricted to cases in which the process of combination takes place rapidly and is accompanied by heat and light, as the combustion of wood in a fireplace, the combustion of a candle, etc. In its more scientific usage, however, the term may designate any possible case of direct combination with oxygen, whether rapid or slow, whether accompanied by light or not. By analogy, the term is also sometimes applied to the rapid union of substances with "supporters of combustion" other than oxygen, such as chlorine gas, in which a candle may burn almost as well as in air.

The light and heat of combustion are utilized for purposes of everyday life, the combustible material employed, i.e., the illuminant or the fuel, being usually some product containing carbon. Thus ordinary illuminating gas contains a number of gaseous chemical compounds of carbon. Coal and wood are mixtures of carbon compounds, the former containing even a considerable amount of free carbon. Hydrogen, too, is one of the chemical constituents of most fuels and illuminants. When combustion takes place, the carbon and hydrogen, combining with oxygen, give, respectively, carbonic-acid gas (carbon dioxide) and water vapor. These are

therefore, the chief products of ordinary combustion.

The heat (measured in gram calories or in kilojoules, as explained in the article CHEMISTRY) that may be obtained by burning a given amount (say, the molecular weight in grams) of a substance, depends on the nature of the substance, on its state of aggregation and temperature (usually 18° C.) before the combustion, and the temperature (usually again 18° C.) of the cooled products of the combustion. All these conditions taken into consideration, every combustible chemical substance has its own characteristic "heat of combustion." The following are the heats of combustion of a few well-known compounds of carbon: ordinary alcohol, 340,000 gram calories; acetic acid (the sour principle of vinegar), 210,000; ethyl-acetic ester, 544,000; cane sugar, 1,355,000; cellulose, 680,000; urea, 152,000. The combustion of a chemical compound may be conceived as taking place in two consecutive steps: first, the compound is decomposed, i.e., every one of its molecules is broken up into its constituent atoms—a process usually involving not evolution, but *absorption* of heat; secondly, every single atom capable of so doing combines with oxygen (O) an atom of carbon (C), thus yielding a molecule of carbonic acid (CO_2), and two atoms of hydrogen (H) yielding a molecule of water (H_2O). This second step of the process is accompanied by the evolution of a quantity of heat depending upon the number of carbon and hydrogen atoms in a molecule of the combustible compound. But, owing to the absorption taking place during the first part of the process, a portion only of the heat produced during the second part actually appears in the form of sensible heat, and it is that portion which is called the heat of combustion. An exact knowledge of the heats of combustion of various substances is of great importance for theoretical as well as for immediate practical purposes. Its practical importance in comparing, e.g., different kinds of fuel, is self-evident and requires no explanation. Its theoretical importance is mainly in the fact that with the aid of it the exact amount of heat evolved or absorbed during various chemical transformations can be readily calculated. According to the first law of thermodynamics, the amount of heat evolved or absorbed during any transformation whatever, is independent of the manner in which the transformation takes place. For example, the amount of heat produced by burning one equivalent weight of ordinary alcohol and one equivalent weight of acetic acid, is the same whether we burn them directly or first cause them to combine into ethyl-acetic ester and then burn the latter. In the second case the heat absorbed during the formation of the ester must, of course, be combined with that evolved during its combustion. But this suggests a simple way of obtaining the heat of formation of the ester by merely carrying out two combustions. The total heat of combustion of free alcohol and acetic acid is 340,000 + 210,000 = 550,000 gram calories (see above); that of ethyl-acetic ester is 554,000 gram calories. The excess of 4000 gram calories must therefore represent the amount absorbed during the combination of alcohol and the acid into ethyl-acetic ester. In a similar manner the heat of any chemical reaction may be determined, if the heats of combustion of the reacting substances and the heats of combustion of the products of the reaction are known. In many cases this is the only certain way of determining with some precision the heat of reactions, as direct measurement during a reaction would often involve very great experimental difficulties, while the direct measurement of the heat of combustion is a comparatively simple matter. The heat of combustion is usually determined by chemists in the following manner: A known amount of the combustible substance is inclosed in an air-tight steel vessel filled with compressed oxygen and lined on the inside with platinum; the vessel is immersed in a calorimeter (see CALORIMETRY), and the substance is ignited with the aid of an iron wire heated by means of an electric current; the observer measures the rise of temperature in the calorimeter, and from this calculates the amount of heat produced. The importance of knowing the heat of chemical reactions is discussed in the article THERMOCHEMISTRY (q.v.).

Now, while the heat of combustion depends only on the chemical nature of the material burned, the rise of temperature caused by it depends to a very great extent on the manner in which the combustion takes place. If other gases, such as the nitrogen of the air, are present without themselves adding to the amount of heat produced, part of that amount goes to heat such gases, and, as a result, the temperature is considerably lower than if the same substance were burned in precisely the amount of oxygen gas required for its combustion. The rapidity with which a combustion takes place is another factor on which the temperature depends; for heat may be gradually dissipated by conduction even while it is being produced, and so the actual amount remaining at any moment during a slow process of combustion may be very small. Thus, when phosphorus is exposed to the air at ordinary temperatures, a slow process of oxidation (combustion) takes place, very little heat being given out at any given moment. If ignited in the air, phosphorus burns vividly, giving out much heat and light for a short time. Finally, if ignited in an atmosphere of pure oxygen, it enters into most vivid combustion, evolving for a very short time a most intense heat and a brilliant light. An analogous phenomenon may be observed when coal is burned in a furnace. So long as the door of the furnace is open and there is but little draft through the fuel, the evolution of heat is moderate and may last several hours. But when the door is shut and much air is drawn through the coal, the latter is more quickly burned; the temperature is higher because more heat is evolved during a shorter period of time, but in the long run the amount of heat produced is the same.

Since the process of combustion is a form of chemical transformation more striking and more commonly met with than any other process, it early attracted the attention of scientific observers. But since, on the other hand, it involves the consumption and formation of gases, it baffled their ingenuity for many centuries. Those light, colorless, aëriform substances had, in the first place, to be discovered; and for a long time they escaped the attention of observers, in spite of their being present everywhere and constantly interfering with experimental work. Further, the peculiar properties of gases, together with the striking appearance

of flames and fires, gave birth to the erroneous idea that material bodies are capable of losing weight by combining with certain "principles" and of gaining weight by having such "principles" taken away from them. Thus the phenomena of combustion long hampered the progress of science. But it was the same phenomena that also finally led to truer conceptions; for their correct interpretation by Lavoisier formed the corner stone upon which rests the gigantic structure of the chemistry of to-day. See FOOD; FUEL; THERMOCHEMISTRY; CHEMISTRY; SPONTANEOUS and SURFACE COMBUSTION.

COMÉDIE FRANÇAISE, kō'mā'dē' frän'sāz' (Fr., French comedy). The official name of the Théâtre Français, the national theatre of France, subsidized by the state for the advancement of dramatic art. Its history dates officially from Oct. 21, 1680, when a decree of Louis XIV amalgamated the two rival companies of the Hôtel de Bourgogne and the Hôtel Guénégaud, the latter being a fusion, after Molière's death in 1673, of the Théâtre du Marais and the Troupe de Molière. It thus maintains a practically unbroken tradition from the time of the great master of comedy and is still familiarly known as the House of Molière. In 1682 the King granted to his comedians an annual pension of 12,000 livres (about $2400), their first subsidy. In 1689 they established themselves in a new house, in what is now called the "Rue de l'Ancienne Comédie," and took the name of "La Comédie Française"; under it they played until the Revolution with a succession of such artists as Baron, Adrienne Lecouvreur, Le Kain, and Mademoiselle Clairon. For a time (1770–82) they were housed in the palace of the Tuileries itself. Later, on the performance of Chénier's antimonarchical play of *Charles IX* in 1789, violent political discussions arose among the performers, and ultimately they split into two sections: the Republican party, under the young tragedian Talma, establishing a new theatre under the name "Théâtre de la République," on the site of the present building in the Rue de Richelieu; while the Royalist section took the title "Théâtre de la Nation." In September, 1793, the latter was suddenly closed by order of the Committee of Public Safety, and the players imprisoned, though they were afterward gradually released. For a few years the rivalry continued; then in 1799, for a short time, there was an absolute interruption in the history of the Théâtre Français. In May of that year, however, the Comédie was once more reorganized and settled in the Rue de Richelieu. Napoleon, while at Moscow, Oct. 15, 1812, prescribed the regulations which, modified in 1850 and 1859, still govern the company. There is an *administrateur-général* appointed by the government. The *sociétaires* are members of the company, who, as shareholders, divide the profits according to certain rules. Before being elected as a *sociétaire,* an artist must have served in the theatre as a *pensionnaire,* upon a salary. A *sociétaire,* after 20 years of service, is allowed to retire with a pension of 4000 francs. The annual sum received from the state is 240,000 francs; and the theatre, being removed from the fear of temporary pecuniary failure, is in no sense a mere business speculation, but serves as an educator of public taste and sets a standard of dramatic training. Here many of the greatest artists of the modern French stage have won their triumphs, including Mademoiselles Mars, Rachel, Brohan, and, for a part of her career, Sarah Bernhardt, and Monsieurs Talma, Got, Mounet-Sully, and Coquelin. Early in 1900 the historic building adjoining the Palais Royal was partly destroyed by a disastrous fire, but was promptly rebuilt in improved fashion within the same lines. Consult: Matthews, *The Theatres of Paris* (New York, 1880); Lucas, *Histoire philosophique et littéraire du Théâtre-Français* (Paris, 1862–63); Bonnassies, *La Comédie Française, histoire administrative* (ib., 1874); Joannides, *La Comédie Française 1680 à 1900, dictionnaire général des pièces et des auteurs,* preface by Jules Claretie (ib., 1901); Cochrane, *The Théâtre Français in the Reign of Louis XV* (London, 1879); and, for a discussion of many of the plays of its recent repertory, Weiss, *Autour de la Comédie Française* (Paris, 1892).

COMÉDIE HUMAINE, ü'mân' (Fr., human comedy). A series of novels by Honoré de Balzac, the first volume of which was published in 1829, but the general title of which was not announced until 1842. Its plan was to present a panorama of the entire life of his country and time. This colossal attempt was left incomplete on his death in 1850. But well-nigh 100 novels remain, dealing with innumerable types and situations characteristic of the France of the early nineteenth century.

COM'EDO MITE. See ACARUS FOLLICULORUM.

COMEDY. See DRAMA.

COMEDY OF ERRORS, THE. An early play of Shakespeare, acted at Gray's Inn, Dec. 28, 1594, and printed in 1623. It was probably suggested by the *Menæchmi* of Plautus. The plot revolves around the amusing blunders caused by the complete similarity, in person, of the twin brothers, Antipholus of Syracuse and Antipholus of Ephesus, and their twin servants, the Dromios, whom even their masters are not able to tell apart.

COME'NIUS, or KOMENSKY, JOHANN AMOS (1592–1670). A noted educational reformer of the seventeenth century, born either at or near Ungarisch-Brod, Moravia. His parents belonged to the Moravian Brethren, and Comenius became one of the leaders of that sect. Though on account of poverty he was unable to begin his education until late—he did not enter the Latin school at Strassnick until he was 16—he attended the gymnasium of Herborn, in Nassau, and later studied at Heidelberg. In the course of his study he became acquainted with the educational reforms of Ratichius (q.v.), and with the report of these reforms issued by the universities of Jena and Giessen.

The work of Comenius included three important fields of activity. His practical work, constituting throughout his life his most immediate concern, was that connected with the Moravian church. In 1614 he was ordained to its ministry, and four years later was given the charge at Fulnek, one of the most flourishing churches of that communion. In consequence of the religious wars he lost all his property and his writings in 1621, and six years later was compelled to flee from his native country on account of the proscription of all Protestants. Settling at Lissa, in Poland, he became director of the gymnasium there and was given charge of the Bohemian and Moravian churches. In 1641 he went to England to join a commission charged with the reform of the system of public education, but the

disturbed political condition of the country interfered with his project. In the following year, at the invitation of Oxenstiern, he applied himself to the task of reorganizing the Swedish schools. He elaborated his plans at Elbing, West Prussia, where he settled in 1642. In 1648 he was elected Bishop of the Moravian Brethren at Lissa, which town he made once more his residence, and where he published a number of his philological works. He subsequently visited Transylvania and in 1650 assisted in drawing up a plan for reforming the Protestant school of Sáros-Patak, Hungary. In 1654 he returned to Lissa; but in the war which soon after raged in Poland he once more lost all his property, including his manuscripts, and was compelled to flee (1657). He traveled through Silesia and Brandenburg, visited Stettin and Hamburg, and finally settled at Amsterdam, where he died.

Through all his wanderings and all his educational activities, Comenius' religious interests were cared for to the neglect of many of his great educational plans. The somewhat mystical bent of his mind, however, led the gifted reformer into extremes that render much of his writings valueless for modern times and in his last years made him an easy dupe of religious impostors.

His second great interest was in furthering the Baconian attempt at the organization of all human knowledge. He became one of the leaders in the encyclopædic or pansophic movement of the seventeenth century, and, in fact, was inclined to sacrifice his more practical educational interests and opportunities for these more imposing but somewhat visionary projects. The men of affairs who aided him with funds and gave him protection and opportunity for continuing his educational investigations and writings were more interested in their immediate practical import, and insisted, in spite of the wishes of Comenius, on his devoting his energies and original insight to the work of organizing schools and writing textbooks or works on method. In 1639 Comenius had published his *Pansophiæ Prodromus*, and in the following year his English friend Hartlib published, without his consent, the plan of the pansophic work as outlined by Comenius. The result of his life's work in this sphere, his *Pansophia*, was destroyed in manuscript in the burning of his home in Lissa in 1657. The pansophic ideas find partial expression in the series of textbooks produced from time to time. In these he attempts to organize the entire field of human knowledge so as to bring it, in outline, within the grasp of every child.

The most permanent influence exerted by Comenius was in practical educational work. Few men since his day have had a greater influence, though for the greater part of the eighteenth century and the early part of the nineteenth there was little recognition of his relationship to the current advance in educational thought and practice. The practical educational influence of Comenius was threefold. He was first a teacher and an organizer of schools, not only among his own people, but later in Sweden and to a slight extent in Holland. In his *Great Didactic* he outlines a system of schools that is the exact counterpart of the existing American system of kindergarten, elementary school, secondary school, college, and university. In the second place, the influence of Comenius was in formulating the general theory of education. In this respect he is the forerunner of Rousseau, Pestalozzi, Froebel, etc., and is the first to formulate that idea of "education according to nature," so influential during the latter part of the eighteenth and early part of the nineteenth century. The influence of Comenius on educational thought is comparable with that of his contemporaries, Bacon and Descartes, on science and philosophy. In fact, he was largely influenced by the thought of these two; and his importance is largely due to the fact that he first applied or attempted to apply in a systematic manner the principles of thought and of investigation, newly formulated by those philosophers, to the organization of education in all its aspects. The summary of this attempt is given in the *Didactica Magna*, completed about 1631, though not published until several years later. The third aspect of his educational influence was that on the subject matter and method of education, exerted through a series of textbooks of an entirely new nature. The first published of these was the *Janua Linguarum Reserata* ('The Gate of Languages Unlocked'), issued in 1631. This was followed later by a more elementary text, the *Vestibulum*, and a more advanced one, the *Atrium*, and other texts. In 1657 was published the *Orbis Sensualium Pictus*, probably the most renowned and most widely circulated of school textbooks. It was also the first successful application of illustrations to the work of teaching, though not, as often stated, the first illustrated book for children.

These texts were all based on the same fundamental ideas: (1) learning foreign languages through the vernacular; (2) obtaining ideas through objects rather than words; (3) starting with objects most familiar to the child to introduce him to both the new language and the more remote world of objects; (4) giving the child a comprehensive knowledge of his environment, physical and social, as well as instruction in religious, moral, and classical subjects; (5) making this acquisition of a compendium of knowledge a pleasure rather than a task; and (6) making instruction universal. While the formulation of many of these ideas is open to criticism from more recent points of view, and while the naturalistic conception of education is one based on crude analogies, the importance of the Comenian influence in education has now been recognized for half a century. The educational writings of Comenius comprise more than 40 titles. In 1892 the three-hundredth anniversary of Comenius was very generally celebrated by educators, and at that time the Comenian Society for the study and publication of his works was formed. Consult: Keatinge, *The Great Didactic of Comenius* (London, 1896); Laurie, *John Amos Comenius, Bishop of the Moravians: His Life and Educational Works* (ib., 1884); Quick, *Essays on Educational Reformers* (ib., 1890); Müller, *Comenius, ein Systematiker in der Pädagogik* (Dresden, 1887); Löscher, *Comenius, der Pädagog und Bischof* (Leipzig, 1889); Monroe, *Comenius and the Beginning of Educational Reform* (New York, 1900).

CO'MES (Lat. *comes*, comrade). A title of honor among the Romans. See COUNT.

COMET (AS., Lat. *cometa*, comet, from Gk. *κομήτης, komētēs*, having long hair, from *κομᾶν, koman*, to wear long hair, from *κόμη, komē*,

hair). The word "comet" had its origin in the hairy appearance often exhibited by the haze or luminous vapors, the presence of which is at first sight the most striking characteristic of the celestial bodies called by this name. The general features of a comet are: a definite point or nucleus, a nebulous light surrounding the nucleus, and a luminous train preceding or following it. Anciently, when a train preceded the nucleus—as is the case when a comet has passed its perihelion and recedes from the sun—it was called "the beard," being termed "the tail" when seen following the nucleus as the sun is approached. This distinction has disappeared from all modern astronomical works, and the latter name is given to the appendage, whatever its apparent position. Neither this luminous attendant, the tail, nor the nucleus, is now considered an essential cometary element, but all bodies in the solar system are classed as comets if they have a motion of their own and describe orbits of an extremely elongated form. There are several plain points of difference between comets and planets. The planets move in the same direction, from west to east, which is astronomically called "direct motion"; but the movements of comets are often from east to west, or retrograde. The orbits of all the planets are confined to a zone of no great breadth on either side of the ecliptic; but the paths of comets cut the ecliptic in every direction, some being almost perpendicular to it. The orbits of all the planets are nearly circular; or, more properly speaking, are ellipses of very small eccentricity. The orbits of comets, on the other hand, present great variety of eccentricity, many of them being ellipses or elongated closed orbits of various degrees of elongation; others, though very rarely, may be hyperbolas: while the majority have a form of orbit not differing sensibly from the parabola, which is the limiting form of curve to which both the ellipse and hyperbola usually approximate. Any attraction, however, of an extraneous body, like a planet, interfering with the attraction of the sun, might change the orbit from the ellipse to the hyperbola, and vice versa, or from the parabola to either. As, however, there is only one parabola corresponding to infinite sets of ellipses and hyperbolas, an interfering cause is not likely to change the orbit from an ellipse or hyperbola to a parabola. Of about 400 comets whose orbits have been obtained with more or less accuracy, 90 appear to describe elliptic orbits and are therefore probably periodical. Of the rest, about 300 orbits cannot be distinguished from parabolas, though many may in reality be ellipses, for the ellipse, when very eccentric, cannot near perihelion be distinguished from a parabola; and in six or seven cases the hyperbolic form of orbit is extremely probable. The discovery that comets are celestial bodies extraneous to our atmosphere is due to Tycho Brahe, who ascertained the fact by observations of the comet of 1577. Newton succeeded in demonstrating that their movements are subject to the same law which controls the planets in their orbits. Halley was the first, by determining the parabolic elements of a number of comets from recorded observations, to identify the comet of 1682 with one which had been observed in 1607 and with one observed by Apian at Ingolstadt in 1531, and thus confidently to predict the return, at the end of 1758 or the beginning of 1759, of a comet which would have the same parabolic elements. This prediction of the first "periodic" comet moving in a closed oval orbit simply meant that the portion of the closed orbit lying nearest the sun, and therefore the only observable portion of the orbit, would very closely resemble the parabolas or open curves in which this comet had been supposed to be moving at its earlier appearances.

For the determination of a parabolic orbit, five elements (q.v.) are necessary: (1) The inclination of the orbit to the ecliptic; (2) the longitude of the ascending node; (3) the longitude of the perihelion, or point of nearest approach of the sun; (4) the perihelion distance, or nearness of approach to the sun; (5) the date of perihelion passage. The first two of these elements determine the plane of the orbit. To determine these parabolic elements, three observations of the comet are sufficient; and by a table of such elements, calculated from recorded observations, it is possible at once to ascertain, as Halley did, whether any newly observed comet is identical with any that has been previously observed. However, to predict with accuracy the time of the return of a comet, a much more accurate calculation must be made of the orbit, taking into account the perturbations of the planets to whose influence it is subject. This difficult problem was solved, in the case of Halley's comet, by the joint work of Lalande, Madame Lepaute, and Clairaut, who announced in November, 1758, just as astronomers began to look out for the return of the comet, that it would take 618 days more to return to the perihelion than on the preceding revolution. The perihelion passage was fixed about the middle of April, 1759; but Clairaut distinctly stated that, being pressed for time, he had neglected small values which collectively might amount to about a month in the 76 years. The comet passed the perihelion on March 12, 1759, exactly a month before the time announced, but within the assigned limits of divergence from that date. The elements of its orbit proclaimed it to be the comet of the former appearances by their similarity. For the next perihelion passage, the different calculations executed by Damoiseau and De Pontécoulant fixed the 4th, the 7th, and the 13th of November, 1835. Subsequently observations indicated the 16th—i.e., a deviation of only three days from what turned out the most accurate calculation, and a deviation of 12 days from the most remote. Its last return to perihelion in 1910 was the occasion of a still more striking triumph of computational astronomy. In anticipation of its reappearance, Cowell and Crommelin instituted a series of researches into its past history and computed the effects of the planetary perturbations on its orbit with such success that, when it was first detected by Prof. Max Wolf, of Heidelberg, on Sept. 11, 1909, its predicted right ascension was found to be only eight seconds in error, while its observed declination was in exact agreement with that predicted. We have adverted to the perihelion passages of this comet in 1531, 1607, 1682, 1759, and 1835. Its earlier returns were traced back to 12 B.C. by Hind, who identified it at each appearance with some notable comet recorded in Chinese or European annals. The more careful researches of Cowell and Crommelin corrected several of Hind's identifications and carried the history of the comet back to the year 240 B.C. The recorded returns of Halley's comet, with

the dates of perihelion passage as computed by them, are given below:

B.C.	240, May 15	A.D.	912, July 20
	163, May 20		989, Oct. 9
	87, Aug. 15		1066, Mar. 27
	12, Oct. 8		1145, Apr. 6
A.D.	66, Jan. 26		1222, Sept. 10
	141, Mar. 25		1301, Oct. 22
	218, Apr. 6		1378, Nov. 8
	295, Apr. 7		1456, June 8
	373, Nov. 17		1531, Aug. 25
	451, July 3		1607, Oct. 26
	530, Nov. 15		1682, Sept 14
	607, Mar. 26		1759, Mar. 12
	684, Nov. 26		1835, Nov. 15
	760, June 15		1910, Apr. 19
	837, Feb. 25		

There are in all about 40 comets whose periodicity is established by the fact that their return has been actually observed. The principal periodic comets, with their periods and the dates of their last-observed perihelion passages, are given below:

Name	Period in years	Last observed perihelion passage
Encke	3 30	Aug. 24, 1911
Tempel II.	5 28	Nov. 10, 1904
Brorsen	5 46	March 30, 1879
Tempel-Swift	5 68	Oct., 4, 1908
Winnecke	5 89	Oct. 9, 1909
De Vico-Swift	6 40	April 27, 1901
Spitaler	6 40	Oct. 26, 1890
Giacobini	6 44	Nov. 2, 1913
Baenard	6.52	Dec. 10, 1892
Perrine	6 53	Oct. 31, 1909
Tempel I.	6 54	Oct. 4, 1898
D'Arrest	6.55	Sept. 16, 1910
Finlay	6 56	Feb. 17, 1900
Biela	6 62	Sept. 23, 1852
Wolf	6.82	Feb. 11, 1912
Holmes	6 86	March 14, 1906
Brooks	7 10	Jan. 8, 1911
Borrelly	7 20	Dec. 18, 1911
Faye	7.41	Nov. 1, 1910
Denning II.	7 42	Feb 10, 1894
Denning I.	8 69	Sept 13, 1881
Tuttle	13.67	Oct. 28, 1912
Stephen	40.09	Jan. 20, 1867
Westphal	61.12	Nov. 26, 1913
Pons-Brooks	71.56	Jan. 26, 1884
Olbers	72.65	Oct. 9, 1887
Halley	76.00	April 19, 1910

Biela's comet (q.v.) is now lost. Another comet which has not been seen lately, though it has been due to appear at least four times since 1879, is that of Brorsen. In 1881, shortly after its last appearance, its orbit intersected that of Denning's comet II near the orbit of Jupiter, and it is supposed that the perturbations which it experienced at that time have radically changed both its orbit and its period.

In June, 1770, Messier discovered a comet which remained visible a long time and enabled Lexell to ascertain the orbit to be an ellipse whose major axis was only three times the diameter of the earth's orbit and corresponded to a periodic revolution of five and one-half years. This result suggested grave difficulties. It had been found impossible to identify this comet with any previously observed, and yet it was difficult to conceive that a bright comet with so short a period of return should have previously escaped observation. What was still more remarkable, it was never seen again, though anxiously looked for in the places where Lexell's orbit would have brought it. It became popularly called "Lexell's lost comet" and gave occasion to many sarcasms by the wits of the day at the expense of astronomers, who had boasted of having found the key to the cometary movements. In the present day the explanation is complete. The comet was never seen before 1770, because its orbit previously had been totally different, its nearest point to the sun having been as distant as the path of Jupiter. Its appearance that year arose out of the fact that in 1767 it was in such close contact with Jupiter, moving in the same direction and nearly in the same plane, that the attraction of that planet entirely changed its orbit. But why has the comet not since been seen? Its passage to the point of perihelion in 1776 took place by day; and in 1779, before another return, it again encountered the vast body of Jupiter and suffered a fresh orbital derangement—the attraction of the planet deflecting it into more distant regions and so changing the form of the orbit that if it had again been visible it would probably not have been recognized as identical with Lexell's comet.

The celebrated comet of 1680, which furnished Newton with the occasion for proving that comets revolve around the sun in conic sections, and that, consequently, they are retained in their orbits by the same force as that which regulates the movements of the planets, appears to have been about the most remarkable for brilliancy of any of which we have authentic accounts. This comet is supposed to be identical with the one that appeared about the time of Cæsar's death (44 B.C.), with that which was seen in the reign of Justinian in the year 531, and with another in the year 1106, in the reign of Henry II; the period of revolution, according to the orbit calculated by Whiston, being about 575 years. In the nineteenth century the comets most remarkable for brilliancy were the comets of 1811, 1843, 1858 (Donati's), 1861, 1880, 1881, and the great comet of 1882. Spectroscopic investigation, so far as yet pursued, points to the conclusion that comets are self-luminous and do not shine merely by reflecting solar light. It has been discovered, in determining the tracks of those streams of dark bodies that cause meteoric showers, that some of the tracks coincide with the orbits of well-known comets. From this it is inferred that star showers and comets may be only different manifestations of the same thing. (See METEORS.) What the matter of the comets consists of is, of course, only a subject for speculation. The composition of the nebulosity and the tail is, at all events, something of almost inconceivable tenuity, as shown by three considerations: 1. Stars seen through them suffer no diminution of brightness, though the light must have to traverse sometimes millions of miles of the cometary atmosphere. 2. Though the thickness of the tail of a comet may be millions of miles, and its length of course much greater, the comets have never been observed to cause any sensible disturbance of the planetary motions, though approaching near enough to be themselves so much affected as to change the entire character of the orbit. 3. The curvature of the tails, and the acceleration of the periodic time in the case of Encke's comet, indicate the possibility of their being affected by a resisting medium, which has never been observed to have the slightest influence on the planetary periods, though so long observed. Even the nuclei of comets appear to be of extremely small density. This may be inferred, though with less force than regards the tails, from the two last considerations above mentioned; and, moreover, there are reliable ac-

counts of stars of a very low order of magnitude being seen through the nuclei themselves.

Instead of pointing to the sun in obedience to the law of gravitation, the tail of a comet is always directed from it and frequently assumes a curved form. It increases in length with its proximity to the sun, but does not acquire its greatest length till perihelion is passed. To explain this phenomenon, Olbers suggested that the sun was the seat of a repulsive force, which was probably electrical in its nature. This theory for a long time gained acceptance, supported as it was by Bredikhine's division of cometary appendages into three classes, according to the nature and the density of the matter composing them. According to Bredikhine, the long straight tails, as seen in the comet of 1861, are composed of hydrogen; the long curved tails, like the principal tail of Donati's comet, consist largely of hydrocarbon vapors; while the somnolent, rare, short tails of violent curvature are made up of mixed iron, sodium, and other metallic vapors. This classification has received some support from spectroscopic evidence. In 1882 Fitzgerald first propounded the theory that the tail was due to the pressure of light upon the gaseous matter composing it; but the small amount of the pressure, as calculated on his assumptions, proved an obstacle to the acceptance of the theory. In 1900 Arrhenius revived the theory, but modified it to the extent of supposing the tail to consist, not of gaseous matter, but of fine particles produced by condensation from the emanations of the comet. The light-pressure theory received confirmation in 1901 from the experiments of Nichols and Hull in America and of Lebedew in Russia.

Much speculation has been devoted to the question of the origin of comets, and several theories have been advanced to account for them. According to one theory, they are wandering bodies which travel through space from star to star; according to another, they are composed of matter which has been violently ejected from the stars during the periods of convulsion to which, arguing from the analogy of the sun, they must from time to time be subject. In any case some of these bodies occasionally visit the solar system, and if one should chance to pass close to one of the larger planets, it may have its velocity retarded to such an extent that its parabolic orbit becomes changed to an ellipse, and in consequence the comet becomes permanently retained as a member of the sun's family. By this "capture theory," which was first suggested by Laplace, the existence of the families of comets which are associated with the four outer planets is accounted for. The members of these families describe elliptic orbits the aphelion points of which lie near the orbits of one or other of the planets Jupiter, Saturn, Uranus, and Neptune. The largest of these planetary families is that which is associated with Jupiter and numbers about 30. They are all comets of short period, ranging from that of Encke's comet, viz., three and three-tenths years, to about nine years. Neptune has a family of six long-period comets, four of which, viz., those of Westphal, Pons, Olbers, and Halley, have been observed at a second reappearance; the other two, which appeared in 1846 and 1847, are expected to return in 1921 and 1927 respectively. The families associated with Saturn and Uranus are small, consisting of two and three members respectively. Besides these planetary families, there are also several well-defined groups of comets which pursue nearly identical paths and appear to have been derived from some common source in space. The most remarkable of these groups consists of the great comets of 1668, 1843, 1880, and 1882, together with a much smaller one which appeared in 1887. All five came to the sun from the direction of Sirius and are supposed to have been separated from a single parent mass by the attraction of the sun, their perihelion passages together with the major axes of their orbits, and consequently their periods, having been variously determined by the special perturbations to which each has doubtless been subject, while the remaining elements of the orbits remain virtually identical.

Comets have been alternately regarded with terror and with welcome in the popular mind. Perhaps the two most famous appearances of Halley's comet were those of 1066 and 1456. In the former year it caused universal consternation throughout Europe and was looked upon as a presage of the success of the Norman invasion of England. One celebrated record of its appearance at that time is to be seen in the Bayeux Tapestry, which is said to have been worked by Queen Matilda, the wife of William the Conqueror, and her ladies. The appearance of the comet in 1456, three years after the Turks had become masters of Constantinople, and just as they were threatening an advance into Europe, was regarded by Christendom with a superstitious dread, and to the Ave Maria was added the prayer: "Lord save us from the devil, the Turk, and the comet." At Constantinople the occurrence of a lunar eclipse at the same time increased the portentousness of the event. The discoveries of science as to the magnitude of the space filled by the bodies of comets and their prodigious velocity, together with the confessed impossibility of always predicting their approach, produced fears of another kind, which have sometimes been, especially in France, extravagantly exaggerated in the public mind. Consult: Guillemin, *The World of Comets* (London, 1881); Zöllner, *Ueber die Natur der Kometen* (Leipzig, 1883); Marcuse, *Ueber die physische Beschaffenheit der Kometen* (Berlin, 1884); Ball, *In the Starry Realm* (London, 1892); Galle, *Verzeichnis der Elemente der bisher berechneten Kometenbahnen bis zum Century* (ib., 1908); Chambers, *The Story of the Heavens* (New York, 1900); Bryant, *History of Astronomy* (London, 1907); Clerke, *Popular History of Astronomy during the Nineteenth Century* (ib., 1908); Chambers, *The Story of the Comets* (Oxford, 1909); Lynn, *Remarkable Comets* (London, 1910).

COMET SEEKER. A telescope having a wide field of view, but a rather low magnifying power, used in searching for comets.

CO'MEY, ARTHUR MESSINGER (1861–). An American chemist, born in Boston, and educated at Harvard University and the University of Heidelberg. In 1885–89 he was instructor in chemistry at Harvard and in 1889–93 professor of chemistry at Tufts College. He was engaged as an analytical and consulting chemist in Boston from 1893 to 1906, when he became director of the Eastern Laboratory of the E. I. du Pont de Nemours Powder Company. He is author of the *Dictionary of Chemical Solubilities* (1896).

COMFORT, kŭm'fẽrt, GEORGE FISK (1833–1910). An American educator. He was born

at Berkshire, N. Y., and graduated at Wesleyan University in 1857. He was one of the leaders in organizing the American Philological Association (1869) and also in establishing the Metropolitan Museum of Art in New York City (1869–72). From 1872 to 1887 he was professor of modern languages and æsthetics in Syracuse University and in 1872 founded there the College of Fine Arts, of which he was dean from 1873 until 1893. In the latter year he became president of the Southern College of Fine Arts, at La Porte, Tex., and in 1896 organized the Syracuse Museum of Fine Arts, of which he became the director. He published: *Art Museums in America* (1869); *Modern Languages in Education* (1886); *Woman's Education and Woman's Health* (1894); *The Land Troubles in Ireland* (1898); and a series of German textbooks.

COMFREY, kŭm'frĭ (OF. *cumfirie, confire,* from ML. *confirma,* probably on account of its strengthening powers, from Lat. *confirmare,* to make firm, strengthen, from *con-,* together + *firmare,* to strengthen, from *firmus,* firm), *Symphytum.* A genus of plants of the family Boraginaceæ. The species, about 20 in number, are natives of Europe, northern Africa, and western Asia. They are perennial plants of coarse appearance, although occasionally to be seen in flower borders. *Symphytum officinale* (the common comfrey) and *Symphytum tuberosum* are natives of Great Britain, frequent in shady and moist places. *Symphytum officinale* was formerly much esteemed as a vulnerary, on account of its astringency, and decoctions of its roots were a household remedy for diarrhœa. Its young leaves and its blanched shoots are also occasionally used as boiled vegetables. The prickly comfrey (*Symphytum asperrimum*), a native of Caucasus, 6 to 10 feet in height, has been highly recommended for feeding cattle. It has been extensively tried in the United States, but its cultivation is not recommended, except when a large bulk of forage is required from a limited area of rich land. It is propagated from roots. *Symphytum asperrimum* and *Symphytum officinale* have become naturalized in the United States.

COM'ICAL GALLANT', THE, or THE AMOURS OF SIR JOHN FALSTAFF. An adaptation, by John Dennis (1702), of Shakespeare's *Merry Wives of Windsor.*

COMICAL LOVERS, THE, or MARRIAGE À LA MODE. A comedy by Colley Cibber (1707), based on portions of Dryden's *Secret Love* and *Marriage à la Mode.*

COMICAL REVENGE, THE, or LOVE IN A TUB. A comedy by Sir George Etherege, played and printed in 1664.

COMINES, kō'mēn', or **COMMINES** (Lat. *Cominæus,* Flemish *Comen*). A border town of France and Belgium, situated on the Lys, by which it is divided into two parts, one belonging to the French Department of Nord and the other to the Belgian Province of West Flanders (Map: Belgium, B 4). It has a number of textile mills and tobacco factories and manufactures cutlery. It has a belfry of the fourteenth century and a ruined castle. The celebrated mediæval chronicler, Philippe de Commines (see COMMINES), was born here. Pop., French portion, 1901, 8129; 1911, 8575; Belgian, 1900, 5957; 1910, 6641.

COMISO, kō-mē'sō. A city in Sicily, in the Province of Syracuse, situated about 13 miles west of Ragusa. It is 800 feet above the sea (Map: Italy, J 11). It was known in Roman mythology as the location of a fabled fountain of Diana, the water of which, when drawn by women of impure character, refused to mingle with wine. It is on the road between Catania and Licata and has two churches, a theatre, and cotton, earthenware, and soap factories. Pop. (commune), 1881, 19,333; 1901, 21,873; 1911, 26,624.

COMITÁN, kō'mē-tän', or **COMITLÁN.** A town in the State of Chiapas, Mexico, situated on the Grijalva River, about 30 miles southeast of San Cristóbal (Map: Mexico, N 9). It has a fine Dominican cloister. The town is largely engaged in agriculture and cattle raising, but has manufactures of cotton and woolen goods, liquors, etc., and carries on a contraband trade with Guatemala and British Honduras. Comitán suffered considerably from the raids of Juan Ortega in 1855–64. Pop., 1900, 9316; 1910, 10,196.

COMITIA, kō-mĭsh'ĭ-ȧ (Lat. nom. pl., assemblies, from *com-* (*con-*), together + *ire,* to go). The formal legal or constitutional meetings of the whole Roman people, convoked by a magistrate, for the purpose of voting. The comitia are thus distinguished from *concilia,* a term strictly applicable to assemblies of any sort, but used especially of assemblies of a part of the people, and *contiones,* gatherings for receiving communications and hearing addresses only, not for voting. It was always a fundamental principle of the Roman constitution that the supreme power was inherent in the citizens, though it might be delegated by them to hereditary or to elected magistrates. All important matters, however, had to be brought before the sovereign people, who could either ratify or reject proposals, though without discussion. Such, at least in theory—and, during the best days of the Republic, in practice also—was the function of the popular assemblies. Under the force of circumstances, from time to time innovations materially altered the position of the two political parties—the patricians and the plebeians. Nowhere can the progress of the struggle between these factions be more clearly traced than in the history of the assemblies, or comitia, by which the supreme authority of Rome was wielded. It is usual to describe the Roman comitia as of three kinds—the Comitia Curiata, or assembly of the curiæ; the Comitia Centuriata, or assembly of the centuries; and the Comitia Tributa, or assembly of the tribes.

1. **Comitia Curiata.** This assembly, that of the curiæ (see CURIA), is believed to have been coeval with the rise of Rome itself. At first the curiæ were probably made up exclusively of the freeholders, or patricians (q.v.), as the freeholders were afterward designated, on whom devolved exclusively the right and the duty of bearing arms. Later, plebeians were included. In the Comitia Curiata each Curia voted as a unit, according to the will of the majority of its members. The purely political importance of the Comitia Curiata declined after the political distinctions between patricians and plebeians terminated; its powers passed largely to the two other kinds of Comitia. It retained, however, to a late period its original powers over the transference of a patrician to the plebeian order and the admission of nonpatricians to patrician standing. It passed also the *lex curiata,* which

was necessary that the higher magistrates might legally have *imperium*, i.e., the executive authority essential to the proper discharge of their official duties. The Comitia Curiata was also summoned, down to late times, to witness the making of wills, or the renunciation of the *sacra* of a gens, as in adoption, or to inaugurate flamens (q.v.) and the *rex sacrorum*. It was then styled *comitia calata*, and was presided over by the Pontifex Maximus. By Cicero's time the Comitia Curiata was represented at meetings by lictors only, 30 in number.

2. **Comitia Centuriata.** As the plebeians (q.v.) increased, a reform of the constitution became necessary, which, we may well conceive, was hastened by the gradual thinning of the ranks of the old freeholders in incessant wars. The plebeians were exempt from service in the field; hence, while their political inferiority must have been galling, their immunity from the chances of war can hardly have been looked upon with equanimity by the patricians (q.v.). It was to redress this twofold grievance that the reform ascribed to King Servius Tullius (q.v.) is generally believed to have been effected. (See also, under ROME, *History of Rome during the Earliest or Regal Period.*) But the whole scheme was one skillfully devised to assign duties to the plebeians rather than to give them rights, and it was evidently the work of a statesman who was acting in the interest of the patricians. The chief authorities for the details of the arrangement are Livy and Dionysius, whose accounts, though they differ in some particulars, agree in the main. Both of them, however, describe the assembly of the centuries rather as it existed in their own day than as it was first constituted. Livy gives the whole number of the centuries, as arranged by Servius, as 194; Dionysius, as 193. The voting was by centuries, each possessing a collective vote, exactly as in the case of the curiæ in the Comitia Curiata. The 18 centuries of *equites* and the 80 centuries of the first class voted first. If they were agreed upon a question, the other centuries were not called upon to vote at all. As the centuries, though nominally "hundreds," probably contained in the first class fewer, and in some of the other classes certainly many times more, than that number, it is plain that in the Comitia Centuriata by far the largest share of power was retained in the hands of the wealthy, of whom the original burgess element would long form the main portion. In any case, the reform of Servius was originally a new military rather than a new political organization, its author intending that the privileges of the patricians assembled in the curiæ should remain as before. But, by a process easily understood, the rights of the curiæ gradually passed to the centuries, and the Comitia Centuriata became thenceforth the chief guardian of the rights of the Roman people as a whole. In later times the number of centuries in the Comitia Centuriata was increased to 373. How the centuries were arranged for voting purposes is a moot question, for which reference may be made to the exhaustive discussion by Botsford, *The Roman Assemblies*, pp. 212–228, and to the literature there cited. Only a magistrate who possessed *imperium* could preside over the Comitia Centuriata. It elected the magistrates who had *imperium* and also the censors; the right of declaring war was vested in it alone. So too it had sole jurisdiction in capital cases. Its legislative powers, which it had wrested from the Comitia Curiata, it surrendered to the Comitia Tributa.

3. **Comitia Tributa.** The tribunes of the people, now the acknowledged leaders of the democracy, took advantage of an ancient division of the original territory of Rome into tribes to establish an assembly democratic in fact, and not merely in appearance (as was the Comitia Centuriata). The tribes, 30, and afterward 35, in number, the leaders of the people succeeded at length, as early as 471 B.C., in forming into a political union entitled to exercise certain functions, chief among which was the election of the inferior magistrates, the approval and rejection of such legislative measures as affected the interests of the plebeians as a class, and the presentation to the Comitia Centuriata, through the consul, of petitions on behalf of the plebeians. At first, then, resolutions passed by the Comitia Tributa had moral force only, not legal; later, by enactments of 449 B.C. and 339 B.C. they had full force of law. In the later Republic laws were usually enacted by the Comitia Tributa. It elected the tribunes of the people and all other plebeian officials. The assembly of the tribes at first included both plebeians and patricians; later it seems to have consisted of plebeians alone. Under the first emperors the form of calling the assemblies together was still observed; but the people met no longer to control their chief ruler, but simply to receive his reports; elections to office had by this time been transferred to the Senate. Consult: Mommsen, *Romische Forschungen*, vol. i (Berlin, 1879), and *Romisches Staatsrecht* (3d ed., Leipzig, 1887); Greenidge, *Roman Public Life* (London, 1901); Abbott, *Roman Political Institutions* (Boston, 1901); Pauly-Wissowa, *Real-Encyclopädie der classischen Altertumswissenschaft*, vol. iv (Stuttgart, 1900); Botsford, *The Roman Assemblies* (New York, 1909).

COMITIUM, kō-mĭsh'ĭ-ŭm (Lat., place of assembly). A small square in ancient Rome, in the Forum, south of the Senate House. It was originally the polling place of Rome, where the Comitia (q.v.) met. It contained the old rostra, and near by was the Græcostasis, or platform for foreign ambassadors awaiting admission to the Senate. In or near the Comitium stood a number of statues, including those of the Augur Attus Navius, Pythagoras, Alcibiades, and Horatius Cocles, and the Ficus Ruminalis. Consult Platner, *The Topography and Monuments of Ancient Rome* (New York, 1911).

COMITLÁN. See COMITÁN.

COMITY OF NATIONS. That species of international legal courtesy by which the laws and institutions of one country are recognized and given effect to by those of another. It is often called by its Latin equivalent, *comitas gentium*. "In the silence of any positive rule," says Mr. Justice Story, "affirming, or denying, or restraining the operation of foreign laws, courts of justice presume the tacit adoption of them by their own government, unless they are repugnant to its policy or prejudicial to its interests." From the existence of so great a number of independent states on the continent of Europe, and of federated states in America, the *comitas gentium* is more called into play in these countries than in England, and it has consequently been more extensively discussed by their legal writers. The principle of the comity of nations, which, as between sovereign states,

rests upon common consent and not upon positive law, has been embodied in the fundamental law of the United States by the provision of the Constitution (Art. IV, Sec. 1) that "Full faith and credit shall be given in each State to the public acts, records, and judicial proceedings of every other State." The apparent violation of this principle in the refusal of some States to recognize divorces granted in others comes under a well-recognized exception to the rule, to the effect that to be entitled to such recognition the act or judicial proceeding in question shall have been within the jurisdiction of the State or the court performing the act or rendering the judgment. See CONFLICT OF LAW; INTERNATIONAL LAW; and the authorities there referred to.

COMLY, SAMUEL PANCOAST (1849–). An American naval officer, born at Woodbury, N. J. After graduating from the United States Naval Academy, in 1869, he was promoted through the various grades, becoming captain in 1905 and rear admiral in 1909. In 1874 he was on the *Juaniata* in the *Polaris* search expedition to Greenland. In the Spanish-American War he was in the charge at San Juan, Porto Rico, and took part in the bombardment of Santiago and the destruction of Cervera's fleet. He commanded the *Alabama* in 1905–07, and was in command of the fourth division of the United States Atlantic Fleet in 1910, and later in the same year of the third division. He was retired in 1911.

COM'MA (Lat., Gk. *κόμμα, komma,* clause, piece, from *κόπτειν, koptein,* to strike). In the mathematical study of sound, in which tones are expressed in exact values by means of their vibration numbers, we find that, by reckoning upward in two different ways to a certain note, the two results show an infinitesimal difference in pitch. This minute interval, called a "comma," is only perceptible in theory and has no actual musical value in our modern "tempered" scale. By tuning upward four perfect fifths from a given note, and then two octaves and a major third from the same note, we reach apparently the same tone; but, calculating the vibrations, we find the first result exceeds the second in the proportion of 81 to 80. This difference is called the comma *syntonum,* or comma of Didymus. The difference obtained by tuning upward 12 fifths and seven octaves from a given tone is $\frac{531441}{524288}$, and is called the comma *ditonicum,* or comma of Pythagoras. These same figures result as the difference between six whole tones above a note and its octave.

COM'MA BACIL'LUS. See CHOLERA.

COMMA BUTTERFLY. A North American nymphaline butterfly (*Grapta,* or *Polygonia, comma*), one of the angle wings, reddish brown with darker spottings, and a light mark, shaped like a comma, on the hinder wing. It is widely distributed and common, feeding upon nettles, and is injurious to hops. See HOP INSECTS.

COM'MANDANT' (Fr. *commandant,* pres. part. of *commander,* to command, ML. *commandare,* to command, from Lat. *com,* together + *mandare,* to enjoin). A relative title, incident to a military command and applied to the commander of a garrison, fortified post, or military school without any regard to his absolute rank. The mounted service school at Fort Riley, Kans.; the Coast Artillery School at Fort Monroe, Va.; the United States Military Academy at West Point; Sandhurst, Hythe, and Kneller Hall, England, are all governed by officers of varying ranks, holding the local title of commandant.

In the United States navy the title of commandant is applied to the commanding officer of a navy yard or naval station. The commandants of the principal navy yards are line officers of the rank of rear admiral; lesser stations are commanded by captains or officers of less rank. To the commandant is given full jurisdiction over all vessels lying at the yard, and he is responsible for all building and repair work. He is also responsible for the proper organization of the working forces; for the effective organization of the yard force for protection against fire; and for the care and management of all machinery, equipment, etc., under his control. He is assisted by an officer of the rank of captain, or of less rank when the commandant is not a rear admiral, who acts as his executive officer and is called the *captain of the yard. Master Commandant* was formerly the title of officers in the United States navy next junior in rank to captains. In 1838 Congress enacted that *master commandants* should thereafter be known as and styled *commanders* (see COMMANDER); the latter title had previously been recognized in the pay bill of March 3, 1835. The title of master commandant was a relic of the days of transition from the time when the fighting on board ships was done by soldiers commanded by an officer of the land forces to that when the fighting and navigating forces were combined. The titles of *sailing master, master, master's mate,* etc., were evidently of pretransition origin; master commandant, on the contrary, was evidently a recognition of a new state of things in which the master mariner had become the *naval commander.*

COMMAND'ER. The title of officers of the United States and British navies next junior in rank to captains. In the United States navy it was established by law in 1838. (See COMMANDANT.) A commander may serve as commanding officer of a division, or of a ship of the second or third rate, or as executive officer of a ship of the first rate. The pay of a commander is $3500 per annum, with an addition of 10 per cent for each five years of service, provided the total amount does not exceed $4500; the pay on sea duty is 10 per cent more.

COMMANDER, LIEUTENANT. See LIEUTENANT COMMANDER.

COMMANDER, LYDIA KINGSMILL (MRS. HERBERT N. CASSON). An American lecturer and woman-suffrage leader, born at Clinton, Ontario, Canada. She was educated at the Collegiate Institute, Strafford, and at Western University, London (both in her native province), and at Meadville (Pa.) Theological School. In 1897 she was ordained a Congregational minister and became pastor of the Free Congregational Church, Baraboo, Wis. In the following year she joined the coöperative colony at Ruskin, Tenn., and also became associate editor of the *Coming Nation.* From 1899 to 1902 she was a member of the editorial staff of the New York *Journal,* and in the latter year she edited the *Bellamy Review* and *Fair Play.* After 1902 she engaged in lecturing and literary work, serving as official lecturer of the New York City Humane Society. She was also speaker at the International Congress of Women at Berlin in 1904 and at Toronto in 1909. She became known especially as a leader in intro-

ducing the more strenuous type of woman-suffrage propaganda in the United States. Besides magazine articles she is author of *Married in the Making* (1903) and *The American Idea* (1907).

COMMANDER IN CHIEF. A relative military title, pertaining to an officer in supreme local military command, as commander in chief of the troops in the field. In the United States it is primarily the absolute rank and title attached to the office of President, and also the military title of many governors of States. Under the sixty-third article of the German Constitution of 1871, the Emperor is the supreme commander in chief of the army and navy. In England the rank, in its permanent sense, has been abolished, and an Army Council appointed, headed by the Secretary of State for War, who is responsible to the crown and to Parliament for the conduct of military affairs.

COMMANDER ISLANDS. A group of islands of the maritime territory of Siberia, situated in Bering Sea, east of Kamchatka, between lat. 54° 32′ and 55° 24′ N., and long. 165° 45′ and 168° 12′ E. (Map: Asia, Q 3). The group consists of the two large and inhabited islands of Bering (607 square miles) and Mednj (180 square miles) and two uninhabited islets. The climate is comparatively mild; but the inhabitants, descendants of Russians and Aleuts, are few in number. The Russian government protects the fur seal, for these islands and the American Pribiloff Islands are the sole remaining breeding grounds.

COMMANDER OF THE FAITHFUL (Ar. *'Amīr al-Mu'minīn*). A designation assumed by the Caliph Omar, the father-in-law of Mohammed, who conquered Syria, Phœnicia, Persia, Egypt, and Jerusalem, and "organized a complete military-religious commonwealth." The title was retained by his successors in the caliphate.

COMMAND'ERY. A regular assembly of Knights Templars. It confers the degrees of Knight of the Red Cross, Knight Templar, and Knight of Malta. The term was first applied, about 1260, to the property of military and religious orders, administered by members of those organizations, who were known as commanders. These had charge of the income of the estates belonging to the orders and had authority to receive gifts and alms. They were accountable to the Grand Commander, who, in the case of Knights of St. John of Jerusalem, resided at Jerusalem.

COMMANDING OFFICER. 1. The officer in actual command of a vessel of war. He is an officer of the line or executive corps, and is usually addressed by the courtesy title of "captain," without regard to actual rank, if he is permanently in command and not merely in temporary charge during the absence of a senior. The regular commanding officer, upon leaving the ship for a temporary absence, is succeeded by the next line officer in rank, but the latter must not alter the regulations established by his superior except in case of urgent necessity. Upon the commanding officer of a modern battleship there rests a responsibility the like of which is placed upon few men. He is answerable for the safety of the ship and of the crew, for the preservation of the battery, engines, boilers, and other machinery in condition for instant use, and for the conduct of all those placed under him, so far as he can control it. He is required to know every detail of construction of his ship and of her equipment as well as of the organization of the crew. He has as an assistant an executive officer, who has charge of the organization of the *personnel*, a first lieutenant who has charge of the hull and equipment; a navigating officer, who has charge of the navigation and navigating apparatus; an ordnance officer, who has charge of the guns and ordnance stores; a senior engineer, who has charge of the propelling and other machinery, including the electric plant; also a surgeon and a paymaster, the latter having charge of the accounts of the men and officers and of the provisions and clothing for the men. 2. In the military services throughout the world the senior officer of a regiment, corps, post, or any detachment where there is not any higher local military authority is regarded as the commanding officer. Regimentally the officer commanding the regiment is spoken of and referred to as the commanding officer

COMMANDITE, kō'mäN'dēt', SOCIÉTÉ EN, or LIMITED PARTNERSHIP. See SOCIÉTÉ EN COMMANDITE.

COMMANDMENTS OF THE CHURCH. Certain rules imposed by the Roman Catholic church on all its members, under pain of grave sin. They number five or six, differing slightly in different countries; but in general they require the observance of Sundays and festivals of obligation by attendance at mass and rest from servile work, the observance of days of fasting and abstinence, the reception once a year at least of the sacraments of penance and holy communion, contribution in proportion to one's means to the support of pastors, and the observance of regulations in regard to marriage.

COMMELIN, kōm'lăN', HIERONYMUS. (?–c.1598). A Flemish printer, born at Douai. He worked at Geneva and later at Heidelberg. The best specimens of his press are the admirable editions of the ancient classics and the Church fathers, to the text of which, often determined by a collation of manuscripts, he added learned critical notes from his own hand.

COMMELIN, JAN (1629–92). A Dutch botanist, born in Amsterdam. He was a professor of botany in the University of Amsterdam and founded in that city the botanical gardens which soon became the most celebrated in Europe. In description of the contents of these gardens he wrote several volumes. He wrote: *Horti Medici Amstelodamensis Rariorum tam Orientalis quam Occidentalis Indiæ Plantarum Descriptio et Icones* (1697).

COMMEM'ORA'TION (Lat. *commemoratio*), or ENCÆNIA (Lat., Gk. *ἐγκαίνια, engkainia*, feast of renovation or consecration, a name for Easter). The great festival of the Oxford academic year, corresponding in some respects to the Commencement of American colleges. It usually takes place on the third Wednesday after Trinity Sunday, in the Sheldonian Theatre—which, like Sanders Theatre, Harvard, and the Kent Theatre, Chicago, is a university building. From time immemorial, public exercises have been held to mark the "act" or period when degrees were conferred on the members of the university. At the present day the proceedings consist of a Latin oration in honor of founders and benefactors (from which the name of the whole ceremony is derived); the conferring of degrees, not only in course, but

also *honoris causa*, on distinguished strangers, who are introduced to the vice chancellor in a short Latin speech; and the recitation, at least in part, of the Newdigate or English prize poem, and the Latin and English prize essays, the three prizes being the gift of the chancellor. The large area or floor is occupied during the proceedings by masters of arts and their male friends; in raised stalls in a semicircle around one end of this area sit the vice chancellor, doctors, and proctors; while the galleries are filled by the undergraduates and women. The undergraduates, until 1876, used to occupy a separate upper gallery; but the license claimed by them of making unofficial and often very witty comments on the proceedings—a survival of the privileges of the *Terræ Filius*, or licensed jester of mediæval times—finally reached a point where it was thought better to discourage it to some extent by breaking up the compact body of students and distributing them among the women present. Commemoration Day itself is only the culminating point of a week of gayety, marked by concerts, balls, theatrical representations, etc., which make Oxford a very attractive place to the visitor; but of late years the glories of this season have tended more and more to be eclipsed by those of the "Eights Week," when the college eight-oared races are rowed, early in May. See OXFORD UNIVERSITY.

COMMEMORATION ODE. An ode by James Russell Lowell, read at exercises held at Cambridge in 1865, in commemoration of the Harvard men who had served in the Civil War.

COMMENCE'MENT (OF., Fr. *commencement*, from OF. *comencer*, Fr. *commencer*, It. *cominciare*, to begin, from Lat. *con-*, together + *initiare*, to begin, from *initium*, beginning, from *inire*, to enter, from *in*, in + *ire*, to go). In American colleges, the name given to the concluding exercises of the college year, when degrees are conferred upon the bachelors, masters, and doctors completing their respective courses of study. The term is applied loosely to the graduating exercises of academies, secondary schools, etc. The custom originated in the mediæval universities, though the appropriate term was "inception." The inception involved two elements: (1) the recognition of the graduate or new teacher by his old master and other members of the profession; (2) the formal entrance of the newly licensed teacher upon his work by the actual performance of its duties. Hence an essential feature of the exercises was that the recipient of the bachelor's degree should "incept," or teach, and that the recipients of the higher degrees should defend a thesis. At Oxford this occasion was called Commemoration (q.v.); but at Cambridge it was, and is yet, called Commencement. The "inceptor" was there called "commencer," i.e., one who commenced teaching. The ceremony and the term were a part of the inheritance received by Harvard College from Cambridge University, and thus became general among American colleges. This exercise in Colonial days was held in the fall, at the commencement of the college year, and the term is often, though erroneously, supposed to refer to this fact. As the mediæval bachelor "incepted," or taught, the graduate of the American college delivered an oration or dissertation before receiving his degree. With the larger colleges even this modification of the old custom is now commonly abandoned, and in many places the Commencement exercises include only the address by the president or some distinguished educator and the conferring of degrees. See UNIVERSITY; DEGREE; COLLEGE; CURRICULUM.

COMMEN'DAM (ML., acc. sg. of *commenda*, trust, from Lat. *commendare*, to intrust, from *com-*, together + *mandare*, to intrust, from *manus*, hand + *dare*, to give; originally used in the phrases *in commendam dare*, to give in trust, or *in commendam mittere*, to send in trust). A term in ecclesiastical law to denote a benefice which, being void, is *commended* to the care of some sufficient clerk to be supplied until it may be conveniently provided with a pastor. In former times bishops frequently held livings *in commendam* in order to appropriate the revenues. The practice has well-nigh ceased in Europe and does not exist in the United States. In the Church of England commendams were abolished in 1836.

COM'MENDA'TION (Lat. *commendatio*, from *commendare*, to intrust). In feudal customs, the act by which a free man became a vassal. See FEUDALISM.

COMMENDATION OF OUR LADY, BALLADE IN. A ballad improperly attributed to Chaucer, according to Tyrwhitt; but really the same poem as the *Invocation of Our Lady*, ascribed to Lydgate.

COMMEN'SALISM (ML. *commensalis*, eating at the same table, from Lat. *com-*, together + *mensa*, table). A sort of partnership or association of two different kinds of organisms by which they endure each other's presence, do each other no harm, and in many cases are of mutual advantage; such are said to be commensals, or messmates. This occurs chiefly among marine invertebrates and is different from parasitism. Many commensals are quite free to separate, yet never dwell apart, and often could not maintain a separate existence. Others grow together so completely that they cannot separate if they would, yet are not parasites, because each retains its form and faculties, while a true parasite changes these in such a manner that it is no longer capable of obtaining food until it has been elaborated for it by the functions of its host. The most familiar example of commensalism is the small crab so often met with inside the shells of oysters—the pinnothere, or oyster crab. Similar crabs inhabit various bivalves the world over, to the mutual satisfaction of guest and host. Within the shelter of the mollusk's pearly house the little crab is safe from its enemies, yet can dash out whenever it observes any prey in the offing and bring it home to be devoured; and the crumbs may be welcome to the oyster. The most striking examples, perhaps, are found among cœlenterates and crustaceans. In the midst of the trailing tentacles, covered with stinging cells, of the Portuguese man-of-war and several jellyfishes, live small fishes, comparatively safe from pursuit of their foes; small fishes also seek refuge among the tentacles of sea anemones and within holothurians. Mollusks live in the burrows of sea urchins that move about in the sand and in the holes made by the crustaceous *Gebia*—a reversal of the oyster and crab.

Certain Dromia crabs carry sponges, ascidians, or sea anemones on their backs or claws. The anemones serve to conceal, and, by means of their nettling organs, protect the crab, while

they get fragments of the crab's food, or, by being transported from place to place, come in contact with more food than if they were stationary. One hermit crab (q.v.) always bears an anemone upon its claw, which is so placed that it blocks the entrance to the shell when the crab retreats within. If the anemone dies or is removed, the crab is at pains to find and transfer a new anemone to its claw. A still more curious case is that of a polyp (*Gemmaria americana*), found in deep water off the Newfoundland coast and allied to the sea anemones, which attaches itself to the shell of a kind of hermit crab, and by budding gradually covers the entire shell with a colony. "It possesses the power of dissolving the shell so that no trace of it can be found. As the polyp colony increases in size as fast as the crab grows, there is no need for the latter to change its abode, while its neighbors and competitors must frequently expose themselves to the discomforts and dangers of house hunting." Consult: Van Veneden, *Animal Parasites and Messmates* (New York, 1876); *Cambridge Natural History*, vol. iii (London, 1865); Semper, *Animal Life* (New York, 1881). For fishes as commensals, consult: Jordan and Evermann, *Fishes of North and Middle America*, pp. 924, 966 (Washington, 1900); Harrington, "On Nereids Commensal with Hermit Crabs," in *Transactions of New York Academy of Sciences*, vol. xvi (1897); for crustaceans, Calman, *The Life of Crustacea* (New York, 1911).

COMMEN'SURABLE (Lat. *commensurabilis*, from *com-*, together + *mensurare*, to measure, from *mensura*, measure, from *metiri*, to mete or measure). Two magnitudes which are of the same kind, and each of which contains a third magnitude an integral number of times, are said to be commensurable; e.g., a foot and a yard are commensurable, an inch or a foot being a common measure. The number 15 and 35 are commensurable, each being divisible by 5.

Magnitudes which have no common measure, i.e., are not multiples of the same unit, however small that unit is taken, are said to be incommensurable; e.g., the side and diagonal of a square are incommensurable. The diameter and circumference of a circle are incommensurable; 2 and $\sqrt{2}$, $\sqrt{5}$ and $\sqrt{7}$ are incommensurable. Numbers like $\sqrt{2}$, that are not commensurable with ordinary rational numbers, are also called incommensurable. In arithmetic, numbers prime to one another are sometimes said to be incommensurable with respect to one another, since they have no common measure except the unit of counting, which, used as a multiplier or divisor, does not change the number affected. See MULTIPLE; IRRATIONAL NUMBER.

COM'MENTARIES, CÆSAR'S. The title of the two extant works of Julius Cæsar, the account of the Gallic War (*De Bello Gallico*) and of the Civil War (*De Bello Civili*). The former is a concise narration of the author's campaigns in Gaul, published in 51 B.C., in seven books, to which an eighth book was added by Aulus Hirtius. The memoirs of the Civil War were afterward extended by other writers to embrace the Alexandrine, African, and Spanish wars. See COMMENTARII.

COMMENTARIES ON THE BIBLE. See EXEGESIS.

COMMENTARII, "Commentaries," a Latin term applied by the Romans to notes or memoranda, and then to record books of various sorts, such as the *Commentarii domestici*, or family memoirs; the accounts drawn up by men of distinction of events in which they had played a part (see COMMENTARIES, CÆSAR'S); the registers of municipal towns; the *Commentarii principis*, a register of accusations brought before the Emperor, and of his decisions in such cases; the *Commentarii pontificum*, *augurum*, and *decemvirorum*, collections of decrees and responses.

COMMENTRY, kō'mäN'trē'. A town in the Department of Allier, France, 8 miles southeast of Montluçon, on the Œil (Map: France, S., G 2). It stands in the centre of one of the most important coal fields of France, and since 1850 has risen from a mere village to a busy and populous town, whose inhabitants are mostly engaged in the coal mines and iron works. There are, besides, saw mills and manufactures of mirrors and cutlery. Pop., 1901, 11,169; 1911 (commune), 10,112.

COM'MER, FRANZ (1813–87). A German musician, born at Cologne, in which city he studied music with Leibl and Klein. After holding a position as organist of the Carmelite church there, he went to Berlin in 1832 to study with A. W. Bach, A. B. Marx, and Rungenhagen. He was *regens chori* at the Catholic Hedwigskirche; singing teacher at numerous schools, and founder (with Küster and Kullak), in 1844, of the Berlin Tonkünstlerverein. He was, in addition, royal music director and a senator of the Berlin Akademie. Together with Robert Eitner he founded in 1868 the Gesellschaft fur Musikforschung, of which he was the first president. He edited a number of collections of old music and composed numerous masses, cantatas, and choruses.

COM'MERCE (Lat. *commercium*, commerce, interchange, from *com-*, together + *merx*, merchandise, from Lat. *merere*, to gain, Gk. *μέρος*, *meros*, share). In its general acceptation, a term denoting international traffic in goods, or what constitutes the foreign trade of all countries as distinguished from domestic trade. The first foreign merchants of whom we read, carrying goods and bags of silver from one region to another, were the Arabs, the reputed descendants of Ishmael and Esau. Their trade was by land. The first maritime carriers of goods were the Phœnicians, who dwelt on a narrow strip of land on the eastern shore of the Mediterranean, and were the founders of the great emporiums of Tyre and Sidon. The Phœnicians established an easier and securer passage between Egypt and Syria than had before been known. The corn and wine of the Nile, and the oil, silk, dyes, and spices of western Asia flowed through their hands. From carriers they became merchants, and to merchandise they added manufactures. They traversed the shores of the Mediterranean, established colonies in the Greek islands, and founded Carthage, one of the most noted commercial cities of the ancient world. The power of the Phœnicians disappeared with the rise of the Greek cities—Athens, Corinth—and of their colonies, of Carthage, and of Alexandria, the great seaport founded by Alexander the Great.

While Rome was giving laws and order to the half-civilized tribes of Italy, Carthage, operating on a different base and by other methods, was opening trade with less accessible parts of Europe. The strength of Rome was in her legions, but that of Carthage in her ships;

and her ships could reach realms where legions were powerless. Her mariners had passed the mysterious Pillars of Hercules into the Atlantic and established the port of Cadiz. They founded Carthagena and Barcelona and had depots and traders on the shores of Gaul. This prosperity of their commerce led to wars with Rome, which ended in 146 B.C. with the destruction of Carthage. In the same year the Romans captured and burned Corinth, which was then an important commercial city. In 273 A.D. land commerce suffered a disastrous blow, when Palmyra was in great part destroyed by the Romans.

Growth of Commerce. The repeated invasions of Italy by the Goths and Huns gave rise to the founding, for defense and for trade, of the city of Venice, about the middle of the fifth century—a city that for more than 1000 years stood foremost in the trade of the world. The Venetians traded with Constantinople, Greece, Syria, Egypt, India, and Arabia, and their vessels carried the products of the East to the ports of western Europe. They had possessions on the coast of Greece and became rulers in the Ionian Islands and in Cyprus. Their rivals, the Genoese, planted colonies on the shores of the Hellespont and the Black Sea, the most flourishing of which was Kaffa (the modern Feodosia), in the Crimea, a great emporium of the commerce between Europe and Asia. A vast commerce was carried on in the Middle Ages by the towns of the Hanseatic League, situated on the shores of the North Sea, and the Baltic, and the rivers flowing into them. When the chief objects of commerce were the skilled products of the East, the South German cities—Nuremberg and Augsburg—through which trade flowed inland, vied with Venice as centres of the Eastern trade. The ports of France and Spain were busy distributing centres. At the close of the Middle Ages Antwerp, having outstripped Bruges and Ghent, became the greatest mart in Christendom. The inventions and discoveries of the fifteenth century transferred the centres of trade successively to Lisbon, Amsterdam, and London. The mariner's compass made distant voyages possible on the open sea. By 1487 the Portuguese had explored the whole western coast of Africa, and in 1497 Vasco da Gama passed round the Cape of Good Hope, to land in India in the following year. Before the end of the century Columbus had thrice crossed the Atlantic, and Cabot, sent out by England, had discovered North America. Nearly all this daring enterprise had for its prime object the finding of some easy route to the fabulously wealthy East, to India and China. But a century elapsed before the English fixed their first establishment or factory in India. The discovery of the New World, however, was destined eventually to change the course and the nature of trade.

From such rapidly spreading exploration and colonization there necessarily arose new wants, new products, new manufactures, and rapidly increasing trade; interrupted more or less by wars, but in the main marching steadily and rapidly on. The nineteenth century witnessed an extension of the commercial relations of mankind to which there is no parallel in history. The history of commerce in the past century would be an epitome of the world's economic development during its most intense and active period, and any enumeration of the causes of the tremendous strides which commerce has made must be partial. The progress of colonization in the widest sense, and the improvement of the means of transportation, are primary factors which cannot be overlooked. In the nineteenth century the greater part of the North American continent was opened up to occupation, Australia and South Africa were peopled by men of white race, while large portions of Asia were brought under the influence of Western rule or Western ideas. This, together with the great increase of population in Europe, has greatly augmented the productive power and consuming power of widely distant parts of the earth, dependent upon commerce for the supply of their mutual wants. Application of steam to transportation alike by land and by water has intensified the progress of colonization as we have here used the term, and made possible the commerce which has resulted from it.

In 1819 the Atlantic Ocean was first crossed by a steam vessel, and regular transatlantic steam communication was inaugurated in 1838. Since then the increase of steam navigation has been rapid, particularly in the last 50 years, until now the greater part of maritime navigation is carried on by steamships. Their far greater bulk and greater speed have led to the gradual displacement of the old sailing ships and have greatly multiplied the potentialities of foreign commerce. The railway has been a factor of the greatest consequence in the development of sea-borne traffic. Before its advent it was only the produce of coast regions, or of those parts adjacent to inland waterways, which could participate in the foreign trade. But the railroad has utterly changed

YEARS	Imports	Exports	Combined Imports and Exports
1613	£2,141,151	£2,487,435	£4,628,586
1662	4,016,019	2,022,812	6,038,831
1703	4,526,579	6,644,103	11,170,682
1770	11,002,000	12,142,000	23,144,000
1800	28,258,000	34,382,000	62,640,000
1855	143,542,850	116,691,310	260,234,160
1890	420,885,695	327,880,676	748,766,371
1905	565,775,602	330,257,726	896,043,328
1912	744,896,514	487,434,002	1,232,330,516

IMPORTS AND EXPORTS

COUNTRIES	Imports	Exports
Argentina	$371,384,000	$463,578,000
Australia	371,825,000	310,792,000
Austria-Hungary	722,030,000	554,973,000
Belgium	899,472,000	753,001,000
Brazil	308,409,000	363,274,000
Canada	670,000,000	355,755,000
China	350,906,000	274,822,000
France	1,534,515,000	1,280,816,000
Germany	2,544,557,000	2,131,718,000
British India	522,389,000	784,503,000
Italy	695,592,000	462,456,000
Japan	307,844,000	261,258,000
Netherlands (1911)	1,332,874,000	1,000,848,000
Norway	135,671,000	87,084,000
Russia	532,768,000	734,905,000
Spain	189,029,000	188,966,000
Sweden	198,320,000	192,960,000
Switzerland	381,966,000	262,020,000
United Kingdom	3,080,022,000	2,371,073,000
United States	1,766,689,000	2,362,696,000

this condition. Of great importance, too, has been the influence of the telegraph in transmitting orders and other communications between distant points without loss of time. These developments have made it possible to transport long distances not only goods whose weight formerly debarred them from a place in foreign commerce, but also more perishable goods which, under the slower transportation of earlier days, could not be handled.

Some notion of the rapid development of commerce can be gained from the statement that the aggregate exports and imports of the United States, which in 1791 were $43,000,000, reached, in 1850, $318,000,000, and in the year ending Dec. 31, 1912, had reached a total of $4,129,000,000. For a comparison with earlier dates, we may select a few figures for Great Britain and Ireland, which show the development of commerce in the past 400 years, as shown in the first table on the preceding page.

World's Commerce. The aggregate commerce of the world was computed in 1890, for the total of exports and imports, at approximately $17,500,000,000. The foregoing statement, which gives the figures, so far as they are available, for the trade of 1912, gives some notion of the relative positions occupied by some of the leading nations, as shown by the second table on the preceding page.

Commerce of the United States. Turning now more especially to the commerce of the United States in recent years, we present a few figures showing the origin and destination of imports and exports, and the character of the goods imported. In the following table the figures for 1895, the year showing the smallest trade of the last decade of the nineteenth century, are given for comparison with those of the year 1912.

FISCAL YEAR ENDING JUNE 30

COUNTRIES	Imports 1895	Exports 1895	Imports 1905	Exports 1905	Imports 1912	Exports 1912
United Kingdom	$159,100,000	$387,100,000	$175,811,000	$523,396,000	$272,940,000	$564,372
Germany	81,000,000	92,000,000	118,268,000	194,220,000	171,380,000	306,959,000
France	61,600,000	45,100,000	89,830,000	76,337,000	124,548,000	135,388,000
Total Europe	383,700,000	627,900,000	540,773,000	1,020,972,000	819,585,000	1,341,732,000
North America	133,900,000	108,600,000	227,229,000	260,570,000	334,072,000	516,837,000
South America	112,200,000	33,500,000	150,795,000	56,894,000	215,089,000	132,310,000
Asia	79,000,000	17,300,000	161,982,000	128,504,000	225,468,000	117,461,000
Oceania	17,400,000	13,100,000	25,388,000	33,079,000	36,464,000	71,936,000
Africa	5,700,000	6,400,000	11,343,000	18,540,000	22,585,000	24,043,000
Total grand divisions	$731,900,000	$806,800,000	$1,117,513,000	$1,481,745,000	$1,653,264,000	$2,204,332,000

The following expresses the same matter in percentages of the total imports and exports:

COUNTRIES	1895		1905		1912	
	Imports	Exports	Imports	Exports	Imports	Exports
Europe	52 41	77.76	48.39	67.23	49 57	60 87
North America	18 29	13.45	20.33	17 16	20.20	23.45
South America	15.32	4.15	13 49	3.75	13.01	6 00
Asia	10.61	2 15	14 50	8.46	13.64	5 33
Oceania	2 39	1 62	2 27	2.18	2 21	3 26
Africa	78	.79	1.02	1 22	1 37	1 09

It will be observed that while relatively the share of Europe in the import trade of the United States remains fairly constant, the share of Europe in the export trade shows a steady decline. This decline is indicative of the gradual change in character of American exports from raw materials to manufactures.

The character of imports into the United States in general is shown in the following table:

IMPORTS INTO UNITED STATES, CLASSIFIED BY CHARACTER

	FOODSTUFFS IN CRUDE CONDITION		FOODSTUFFS WHOLLY OR PARTLY MANUFACTURED		CRUDE MATERIALS FOR USE IN MANUFACTURING		MANUFACTURES FOR USE IN FURTHER MANUFACTURING		MANUFACTURES READY FOR CONSUMPTION		MISCELLANEOUS	
	Value	Per cent of total	Value	Per cent of total	Value	Per cent of total	Value	Per cent of total	Value	Per cent of total	Value	Per cent of total
1850	$18,011,000	10.38	$21,465,000	12 37	$11,711,000	6 75	$26,163,000	15 08	$95,312,000	54.93	$845,000	.49
1860	35,743,000	10.11	53,771,000	15 26	37,073,000	10.48	23,613,000	6.67	199,878,000	56.52	3,536,000	1.00
1870	53,981,000	12 38	96,253,000	22.08	53,118,000	12 18	54,545,000	12 51	173,034,000	39.69	5,024,000	1 16
1880	100,297,000	15 01	118,125,000	17 69	131,861,000	19 74	110,779,000	16 59	196,587,000	29.43	10,303,000	1 54
1890	128,480,000	16 28	133,332,000	16.89	170,637,000	21 62	116,924,000	14.81	230,685,000	29.23	9,251,000	1.17
1900	97,916,000	11.52	133,027,000	15.65	276,241,000	32 50	134,221,000	15.79	203,126,000	23.90	5,407,000	.64
1910	144,776,000	9 30	181,566,000	11 66	566,270,000	36.37	285,138,000	18.31	367,723,000	23.62	11,471,000	.74
1912	230,358,000	13.93	196,100,000	11.86	555,986,000	33 63	293,739,000	17.77	360,018,000	21.78	17,061,000	1.03

The most important articles imported were coffee ($117,826,000), sugar ($115,515,000), India rubber and gutta-percha ($102,941,000). The most striking facts brought out by the table are

the increase in importation of crude materials for use in manufacture (from 6.75 per cent of the total in 1850 to 33.63 per cent in 1912) and the decline in the relative importance of manufactures ready for consumption (from 54.93 per cent in 1850 to 21.78 per cent in 1912).

The evidence offered by the statistics of imports as to the change in character of American economic life is corroborated by the statistics of exports. Manufactures ready for consumption increased from 12.72 per cent of the total

EXPORTS FROM THE UNITED STATES, CLASSIFIED BY CHARACTER

	FOOD STUFFS IN CRUDE CONDITION OR ANIMALS		FOOD STUFFS PARTLY OR WHOLLY MANUFACTURED		CRUDE MATERIALS FOR USE IN MANUFACTURING		MANUFACTURES FOR FURTHER USE IN MANUFACTURING		MANUFACTURES READY FOR CONSUMPTION		MISCELLANEOUS	
	Value	Per cent of total	Value	Per cent of total	Value	Per cent of total	Value	Per cent of total	Value	Per cent of total	Value	Per cent of total
1850	$7,535,000	5.59	$20,017,000	14.84	$83,984,000	62.26	$6,060,000	4.49	$17,162,000	12.72	$,739,000	.10
1860	12,166,000	3 85	38,624,000	12.21	21,600,900	68 31	12,641,000	3.99	35,811,000	11.33	988,000	.31
1870	41,852,000	11.12	50,919,000	13.53	213,439,000	56.64	13,711,000	3.66	56,329,000	14 96	363,000	.09
1880	266,108,000	32 30	193,352,000	23 47	238,787,000	28 98	29,044,000	3 52	92,774,000	11 26	3,878,000	.47
1890	132,073,000	15.62	224,756,000	26 59	304,566,000	36.03	46,454,000	5.50	132,527,000	15 68	4,915,000	.58
1900	227,347,000	16.59	318,126,000	23 21	325,589,000	23.75	152,890,000	11.15	331,955,000	24.22	14,854,000	1.08
1910	109,828,000	6 43	259,259,000	15 16	565,934,000	33.09	267,765,000	15.66	499,215,000	29.19	8,079,000	47
1912	99,899,000	4 60	318,838,000	14.69	723,008,000	33.31	348,149,000	16 04	672,268,000	30 98	8,155,000	.38

in 1850 to 30.98 per cent in 1912. As indicative of the same tendency, we may note the increase in exportation of partly manufactured goods from 4.49 per cent of the total in 1850 to 16.04 per cent in 1912. Other points of interest brought out by the table are the rise of exports of crude foodstuffs from 1850 to 1880 and their subsequent steady decline. This is indicative of the history of American wheat culture. The steadiness of the relative position of crude materials among exports is largely due to the dependence of European countries upon American cotton, of which the exports in 1912 amounted to $565,849,000.

Bibliography. *Commerce and Navigation of the United States*, issued annually by the Bureau of Statistics, Department of Commerce; the monthly *Summary of Commerce and Finance*, which contains important monographs on special topics; *Consular Reports*, issued daily and monthly, and *Commercial Relations*, published annually, by the Bureau of Foreign Commerce, State Department, give information regarding trade conditions abroad, gathered by the consuls of the United States. The preliminary section of *Commercial Relations* is a review of the world's commerce and is also published separately. Similar official publications are issued by other governments. The consular reports of Great Britain, France, the German Empire, Austria, Italy, and Belgium are to be especially noted, as well as the annual *Statistical Abstract of Foreign Countries* issued by the British Board of Trade.

Among historical and descriptive works, the following will be found useful: Cunningham, *The Growth of English Industry and Commerce* (Cambridge, 1890); Gibbins, *History of Commerce in Europe* (London, 1891); Levi, *History of British Commerce, 1763–1878* (ib., 1880); Day, *A History of Commerce* (New York, 1907); Greenwood, compiler, *Classified Guide to Technical and Commercial Books* (ib., 1905). Among works on commercial geography are Chisholm, *Handbook of Commercial Geography* (London, 1890), and Bartholomew's *Atlas of the World's Commerce* (London, 1906). See BALANCE OF TRADE; EXCHANGE; FOREIGN MONEY; LABOR AND COMMERCE, DEPARTMENT OF.

COMMERCE. A city in Hunt Co., Tex., 90 miles northeast of Dallas, on the St. Louis, Southwestern, and the Texas Midland railroads (Map: Texas, E 3). It is the seat of East Texas Normal College. Commerce carries on a trade in cotton, grain, and cattle, and there are planing, flour, and cottonseed-oil mills, railway repair shops, machine shops, bottling works, and lumber yards. The city contains a public park and owns its water works. Pop., 1900, 1800; 1910, 2818.

COMMERCE COURT. A court created by Act of Congress in 1909 to have jurisdiction in all cases for the enforcement of orders of the Interstate Commerce Commission, other than for the payment of money. The court consisted of a presiding judge and four associate judges, having the rank and tenure of judges of the circuit court. It was believed by the framers of the act that the establishment of such a court would expedite the disposal of cases in its jurisdiction and relieve the circuit courts of a work for which they are not well adapted. Shortly after the organization of the Commerce Court friction arose between it and the Interstate Commerce Commission, the court claiming power to review the findings of the commission as to questions of fact as well as to determine questions of law. By decision of the Supreme Court in 1912 the powers of the Commerce Court were limited to questions of law. The court early acquired a reputation for undue friendliness to the carriers and a reactionary attitude towards the commission. Its position was further compromised by the scandals arising out of the conduct of one of its members, R. W. Archbald (q.v.), and his impeachment in 1912. A bill to abolish the Commerce Court was passed by both houses in 1912, but was vetoed by President Taft. Shortly after the inauguration of President Wilson the court was abolished.

COMMERCIAL COURT. A court constituted of judges of the King's Bench Division, in England, for the trial of commercial causes, i.e., of causes arising out of the ordinary transactions of merchants and traders, such as those relating to the construction of mercantile docu-

ments, the export or import of merchandise, affreightment, insurance, banking, mercantile agency, and mercantile usages. It was not established by an act of Parliament, but was devised by the King's Bench Division for the convenience of suitors and the more expeditious determination of mercantile disputes. While this court has no power to dispense with the ordinary rules of evidence, or to depart from the administration of the law in the ordinary way, it is able, with the assistance of parties and counsel, to dispose of commercial disputes with much more expedition than is possible under the ordinary judicial procedure. Commercial cases are tried by this court upon the evidence prescribed by the orders made in chambers, without difficulty or delay, and with a great diminution of the cost incidental to actions in which the ordinary modes of litigation are followed. This court is a reminder of the Court Piepoudreux, in which the primitive law merchant (q.v.) of England was administered —the court which Lord Coke declares was "incident to every fair and market, because that for contracts, and injuries done concerning the fair or market, there shall be as speedy justice done for the advancement of trade and traffic as the dust can fall from the feet." The connection of this court with merchants of the staple is disclosed by 27 Edw. III, c. 2, which declared that it was designed to give courage to merchant strangers to come with their wares into the realm, and that it should dispense justice according to the law of the staple, or the law merchant, and not according to the common law. Courts for the rapid settlement of trade disputes, called Pypowder courts, were provided for in New York in 1692 (vol. i, Col. Laws, ed. 1894) but these were later merged in the ordinary courts of justice. See COURT. Consult the article, "Merchants of the Staple," in *London Quarterly Review*, vol. xvii, p. 56 (London, 1901).

COMMERCIAL CRISES. See CRISIS, ECONOMIC.

COMMERCIAL EDUCATION. See EDUCATION, COMMERCIAL.

COMMERCIAL GEOGRAPHY. See GEOGRAPHY, ECONOMIC.

COMMERCIAL LAW. A popular term of varying and rather indefinite signification. It includes ordinarily the legal rules which relate most directly to everyday mercantile transactions, and which are based upon, or have been modified by, the usages of trade. These rules are presented in connection with the different topics of commercial law, under such titles as BAILMENT; INSURANCE; NEGOTIABLE PAPER; PARTNERSHIP; SALE; ETC. See also LAW MERCHANT; MERCANTILE LAW.

COMMERCIAL PAPER. See BILL OF EXCHANGE; NEGOTIABLE PAPER.

COMMERCIAL REGISTERS. See MERCANTILE AGENCY.

COMMERCIAL TEMPERANCE LEAGUE. See LEND-A-HAND CLUBS.

COMMERCIAL TRAVELER. A representative of a wholesale or jobbing house, sent throughout the country for the purpose of selling goods to smaller houses in the same line of trade. The commercial traveler is the legitimate successor of the old peddler, though his operations are on a larger scale, and his manner of doing business quite different. In former days, in addition to the peddler, who carried his stock of wares with him, producers frequently came into contact with the purchasers through the great fairs which were held throughout the year in the different commercial centres, and which were a means of drawing sellers and buyers together from great regions of country. The commercial traveler sells by the aid of samples, price lists, and the like, and carries with him no goods for sale. The system of employing commercial travelers is a natural outgrowth of the localization of interests in particular places and of the extension of the markets for particular commodities. It is estimated by the commercial travelers themselves that their class numbered in the United States in 1890 some 300,000 persons. It is claimed by them that since that time their number has decreased, largely through the concentration of capital and the concentration of the management of business in the hands of the so-called trusts. It is claimed by the managers of trusts that one of the chief advantages of their organization has been the saving in the cost of distribution, notably in that of selling goods. It is represented that the various factories and enterprises each employ commercial travelers, whose main duty is not to induce the would-be purchaser to buy, but to persuade him to buy a particular make of goods. As the competition between the different sellers of the same goods ceases by the combination of interests, it is obvious that, instead of sending several salesmen into a district, one can transact all the business it offers. The commercial travelers in the United States are organized in various associations for the purpose of promoting their interests as a class. Of these, perhaps the most important is the Commercial Travelers' Protective League. Consult: Allen, *Ambassadors of Commerce* (London, 1885); testimony of P. F. Dowe before the United States Industrial Commission, in vol. iv of the commission's *Report* (Washington, 1900); also Jenks, *The Trust Problem* (New York, 1900); "Commercial Travelers in Foreign Countries," in *United States Special Consular Reports*, vol. xxviii (Washington, 1904).

COMMERCIAL TREATIES. Treaties between states regulating the commercial rights of the nationals of each in the territories of the other. Such treaties determine reciprocally the rights of the citizens of the one country to resort to the other, to acquire property, to buy and sell. They establish the conditions under which debts due a foreign trader may be collected through the courts, insure him against onerous taxation, etc. Such treaties may assure the citizen of a treaty state the same privileges as those enjoyed by any other treaty state (most-favored-nation clause), or they may admit of discriminations. They may give the citizen of the treaty state privileges in trade identical with those of nationals. This policy is common, but by no means universal.

Treaties of commerce existed in antiquity before the extension of the Roman Empire to practical control of the known world. After the breakdown of the Empire the rights of foreign traders were determined chiefly by custom. In many cases arrangements between the guilds of cities in different regions assumed the form of commercial treaties. Relations between citizens and foreign traders were subject to more or less systematic regulation by the various princes. In the twelfth century, with

the revival of trade and navigation in the Mediterranean, commercial treaties between states became common. A century later a system of commercial treaties grew up in northern Europe.

The early commercial treaties were subject to great variation in content. Each of the several states competing for a particularly lucrative trade would seek to secure more favorable treaties than the other states enjoyed. Apparently before the end of the fifteenth century the principle of equalizing the position of citizens of rival nations had been established in the commercial relations between the Italian cities and the Turks. By the middle of the seventeenth century the principle had become familiar in western Europe also. Since the beginning of the eighteenth century practically every treaty of commerce has contained a clause assuring reciprocally most-favored-nation treatment.

Until modern times no attempt was made to regulate duties through treaties of commerce. The earliest treaty involving the reduction or limitation of duties was the Methuen Treaty between England and Portugal (1703). By this treaty the prohibition upon the importation of English woolens into Portugal was withdrawn, and Portuguese wines were admitted to the English markets upon payment of a duty one-third less than those imposed on French wines. The principle of reciprocal concessions in duties played an important part in the Treaty of 1786 between France and England, and a still more important part in the Treaty of 1860 between France and England. See RECIPROCITY.

Upon the revocation of a treaty of commerce involving reciprocal concessions in duties, the rates imposed upon importations from non-treaty nations become automatically effective. Theoretically the revocation of the treaty destroys also the rights of domicile, the rights of purchasing and selling, the right of employing the courts for the collection of debts, etc., enjoyed under the treaty by the citizen of one state in the territory of the other. In practice, the most essential provisions of an abrogated treaty are usually continued under an executive agreement until a new treaty can be negotiated. See TREATY; RECIPROCITY, and references under the latter.

COMMERCY, kô'mâr'sē'. The capital of an arrondissement in the Department of Meuse, France, on the Meuse, 183 miles east of Paris by rail (Map: France, N., L 4). It is a garrison town and has an interesting seventeenth-century castle, with literary associations of Cardinal de Retz, which also for a time was the residence of Stanislas, King of Poland and Duke of Lorraine. Here, too, Voltaire composed his *Semiramis*. A statue of Don Calmet, the historian, who was born near Commercy, stands in the town. Coal mining constitutes the chief industry; other trade is in hardware, forgings, steel plates, embroidery, and wines. Pop., 1901, 7726; 1911, 8876.

COMMERS, kô-mĕrs' (Ger. *Kommers*, drinking bout, from Lat. *commercium*, trade, from *com, together* + *merx*, merchandise). A social gathering of German students on festival occasions, such as the beginning and ending of the semiannual term (*semester*), the anniversary of the foundation of the university, etc. The main features of such meetings consist in speeches and songs, the famous collection of German student songs, *Gaudeamus igitur*, being used. Several senior students are elected as officials (*Chargierte*) and have entire charge of the affair. Certain rules of etiquette in drinking must be strictly adhered to. Beer is the sole beverage used, and generally a great quantity of it is consumed. After each speech the presiding senior calls for a salamander (*ad exercitium salamandris, bibite, tergite*). All arise and, after having emptied their glasses, pound three times vigorously with them on the tables. If a club member dies, a salamander (*Trauer-salamander*) is executed in his memory at the next club commers, when all empty glasses are dashed to pieces. Each students' club arranges a large commers on the anniversary of its foundation. A great many former members visit their alma mater on this occasion, and he is especially honored who can count the most semesters since his matriculation as a student.

COM'MINA'TION (Lat. *comminatio*, threat, from *comminari*, to threaten, from *com*, together + *minari*, to threaten). The name given to a penitential service used in the primitive Church. In the early Church those who were guilty of grievous and notorious sins were put out of the Church, until, on their repentance and after long trial, they were restored to full communion. It seems that, at least from the beginning of the eighth century, there was an office of this kind for public penitents on the first day of Lent; but from various causes the penitential discipline became extinct, both in the Eastern and Western churches, and the office for Ash Wednesday (so called from the penitents formerly coming clad in sackcloth and ashes) is the only memorial of it left. The office, as used in the Church of England, is nearly the same as the older ones found in the pre-Reformation service books of Salisbury and York. The curses contained in Deut. xxvii. against impenitent sinners are read, and the congregation answers "Amen" to every sentence, as acknowledging the justice of the sentences. The penitential office of the American Book of Common Prayer retains only the concluding prayers. Consult Bingham, *Origines Ecclesiasticæ; or, the Antiquities of the Christian Church* (10 vols., London, 1708–22; later ed., 1838–40).

COMMINES. See COMINES.

COMMINES, kô'mēn', PHILIPPE DE (*c.*1445–?1511). A French statesman and historian. He was born at the castle of Renescure, not far from Hasebrouck, received a careful education, and in 1464 attached himself to Charles the Bold of Burgundy (then Count of Charolais). In 1472 Commines entered the service of Louis XI, the rival and enemy of Charles, who made him one of his confidential advisers. He proved himself a very suitable agent for carrying out the designs of the crafty monarch; but after the death of Louis he incurred the displeasure of the regent, Anne de Beaujeu, by his adherence to the party of the Duke of Orléans (afterward Louis XII), and, after being imprisoned at Loches in an iron cage, was sentenced to the forfeiture of a part of his estates and to 10 years' banishment. This punishment, however, does not seem to have been carried out, for after a few years we find Commines again employed in important affairs of diplomacy; but though he was engaged in the service of Charles VIII and the Duke of Orléans, he failed

to win the confidence of these masters. He died at his castle of Argenton, October 18, probably in 1511. Commines's *Mémoires*, which are a complete survey of the political history of his time and depict vividly the character of Louis XI, are admirably written and afford abundant proof of an acute and vigorous mind. He seems to have looked keenly into the heart of every man who crossed him in life and with cool and severe precision to have dissected him for the benefit of posterity. Among the many editions of his *Mémoires*, the best are those by Lenglet-Dufresnoy (4 vols., London, 1747); by Mademoiselle Dupont (3 vols.), in the *Collection de la société de l'histoire de France* (Paris, 1840–47); by Chantelauze (Paris, 1881); but the best of all is the latest edition by Mandrot (2 vols., Paris, 1901–03). An English translation can be found in the Bohn Library.

COM'MISSA'RIAT (Fr., from ML. *commissarius*, one intrusted with a commission, from Lat. *commissus*, p.p. of *committere*, to commit, from *com*, together + *mittere*, to send). A department of army supply. Until 1912 the department of the United States army providing rations was known as the Commissary or Subsistence Department and supplied food only. It was administered by its chief, the commissary general. On Nov. 1, 1912, the pay, subsistence, and quartermaster's departments were consolidated, by law, under the title *The Quartermaster Corps*, its chief having the title of *Chief of the Quartermaster Corps* with the rank of major general. This consolidated corps now provides subsistence, pay, transportation, clothing, and quarters. Arms, ammunition, and other ordnance supplies are furnished by the *Ordnance Department*. Fortifications are constructed and repaired by the *Engineer Corps*.

In Great Britain the commissariat and army-service corps are responsible for both supply and transport of food. Owing to the constant demands made upon it, and its peculiar importance under the present army system, this branch of the British army is probably unrivaled by that of any other country. A similar system of commissariat to that of the United States obtains throughout Europe generally. See ARMY ORGANIZATION; FIELD COOKING; RATIONS.

COM'MISSARY (Fr. *commissaire*, ML. *commissarius*, commissary, one intrusted with a commission). Formerly an officer of the Subsistence Department of the United States army. This department was abolished by absorption into the Quartermaster Corps Nov. 1, 1912. The duties formerly performed by commissaries are now in charge of quartermasters. (See QUARTERMASTER CORPS.) Regimental commissaries and regimental commissary sergeants were retained when the consolidation was made. At military posts and stations and in the field, the *regimental commissaries*, who are officers of the rank of captain and are appointed to the regimental staff for a term of four years by the commanding officer, assisted by regimental commissary sergeants, perform their duties in the quartermaster's department at the headquarters of their regiment. *Regimental commissary sergeants* belong to the noncommissioned staff. There is one to each regiment. The duties of the commissary, in the English army, are performed by the Army Service Corps; and regimentally, by the regimental quartermaster, assisted by his quartermaster sergeant.

COMMISSION (Lat. *commissio*, commission, from *committere*, to commit, from *com*, together + *mittere*, to send). Boards created for governmental purposes, generally of a temporary nature. They have proved effective agencies for dealing with certain phases of international relations and controversies, and for this purpose are of two classes: (1) commissions of a domestic character, created under statute for carrying out provisions of treaties and conventions; (2) commissions performing international functions, in the nature of conference or arbitration boards.

Examples of the first class in the United States are the commissions created (*a*) under the Treaty of 1819 with Spain, ceding Florida, by which the government sought to adjust citizens' claims growing out of the preceding unfriendly relations; (*b*) under the Treaty of 1826 with Great Britain, to distribute the indemnity for slaves deported in derogation of Art. I of the Treaty of Ghent; (*c*) under the Treaty of 1831 with France, to distribute the indemnity paid for the Spoliation Claims; (*d*) under the Treaty of 1871 with Great Britain, to distribute the Alabama Claims award.

Commissions of the second class have been the usual agencies for effecting arbitrations and, according to their purpose and the authority of their members, may be either merely for conference or for the determination of methods of reaching settlement of disputed questions, or may themselves have the power to adjudicate the issues in controversy. In the latter case they may be composed solely of representatives of the States concerned, or they may include neutral parties selected by these States to act as umpires. During the nineteenth century arbitration as a method of settling international differences steadily increased. The United States has been a party to no less than 57 adjustments of this character, and, except for the train of circumstances resulting in the War of 1812, all differences between this country and Great Britain have been so adjusted. (See ALABAMA CLAIMS; ARBITRATION, INTERNATIONAL; BERING SEA CONTROVERSY; and consult the authorities there cited.) In England and the United States commissions are often instituted, either by legislative authority or by the executive, to assist the government by investigation or advice in matters of internal policy or as permanent organs of administration. Thus New York has instituted a Commission of Appeals with judicial functions to relieve the overcrowded calendar of the Court of Appeals; the United States government has by act of Congress created an Interstate Commerce Commission (q.v.), an Industrial Relations Commission (q.v.) etc. Many of the States have instituted Public Service Commissions (q.v.), Commissions on Prison Reform, etc.

COMMISSION, MILITARY. A certificate of authority or rank, or both. Military rank is defined in the United States Army Regulations as "that character or quality bestowed on military persons which marks their station and confers eligibility to exercise command or authority in the military service within the limits prescribed by law." To such military persons commissions are granted only by the President of the United States, confirmed by the Senate, and published through the Adjutant General's Department. Commissions in European armies are usually distributed among the graduates of the national military preparatory or training

colleges, according to the results of competitive examinations. They are usually restricted, however, even in republican France, to men of good birth or wealthy heritage. In the British army, formerly, commissions, except in the artillery and engineers, were obtainable by purchase—a condition of things which became more and more undesirable as the science of war advanced and thorough preparatory education and training became necessary. It was not until 1871 that the system was abolished by the Gladstone government in the face of great opposition, and the present condition of things inaugurated. The prices of commissions rose gradually from the time of Charles II until the Crimean War of 1854, at which period they ranged in value from £450 for a commission as ensign of infantry of the line to £7250 for that of lieutenant colonel of Foot Guards. At the present time, in the English army, first commissions are granted to successful candidates in open competitive examinations; to highly and specially recommended noncommissioned officers; to certain qualified university graduates; to graduate cadets from government military schools; to a limited number of junior militia officers. See ARMY ORGANIZATION; RANK AND COMMAND.

COMMISSIONAIRE, kŏm-mĭsh'ŭn-âr', *Fr. pron.* kô'mē'syô'nâr' (Fr., commissioner). An attendant at Continental hotels, employed to perform certain miscellaneous services, such as attendance at railroad and steamboat stations to secure guests, taking charge of luggage, seeing it through the customhouse, and sending it on to the hotel, etc., for all which a fee is charged. In Paris such attendants are generally respectable and intelligent and speak English with tolerable fluency. In other parts of the Continent—such as Germany and Austria—there is also a class called commissionaires, who are analogous to the American messenger boys. There, too, they are employed by companies and are uniformed, but one may not call them up by telephone or signal as here, it being their custom to solicit services upon the street. A corps of commissionaires, an association of disabled soldiers of good repute who had retired with a pension, was founded in Great Britain by Sir Edward Walter in 1859, the service of which now extends throughout the large cities. These men are employed in the most varied capacities where high qualifications are required, and may be engaged for permanent or temporary service. So great is the demand for this kind of service that several thousand men are now engaged in it, with stations in many towns of Great Britain and its colonies.

COMMIS'SIONER (from ML. *commissarius,* one intrusted with a commission). Most commonly a person appointed for public service by a commission or mandate of a political authority, but also, sometimes, any one of certain officers elected by popular vote. The term is generally employed to describe an appointive officer who has charge of some branch of a department of government and who is subject to the supervision of a higher official or public board, as a commissioner of water supply of a municipality, who is usually under the control of the mayor or common council. It is the almost invariable title of persons appointed by the government to carry on or supervise some special public work of a transitory nature, as to investigate the conditions and resources of a colony. See COMMISSION.

Commissioner of Assize, in English law, is one to whom a commission is issued by the crown, directing him to "take the assizes," i.e., to act as a justice in hearing certain actions in specified judicial circuits. It may issue to a barrister or sergeant at law as well as to a regularly appointed judge. The practice of appointing these commissioners arose during the reign of Edward I because of the lack of regular courts in the various parts of the country. By the Supreme Court of Judicature Act of 1873, one exercising jurisdiction under a commission of assize is deemed to constitute a court of the High Court of Justice, having all the powers of that court. See ASSIZE; HIGH COURT OF JUSTICE.

Commissioner of Deeds is a person authorized by the state to take acknowledgments of the execution of legal instruments and administer certain oaths voluntarily taken out of court. His powers vary in each jurisdiction and are somewhat similar to, but usually more limited than, those of a notary public. See NOTARY PUBLIC.

COMMISSIONERS OF THE NAVY. See ADMIRAL; also ADMIRALTY.

COMMISSION FORM OF GOVERNMENT. See MUNICIPAL GOVERNMENT.

COMMISSION MERCHANT. A person, called also a *factor,* employed to sell goods consigned or delivered to him by another who is called his principal, for a certain percentage, commonly called his commission or factorage. As the goods thus received are said to be consigned, the commission merchant or agent is often called a consignee. See FACTOR.

COMMIT'MENT (from *commit,* Lat. *committere,* to commit). A warrant of a justice, magistrate, or other official having police jurisdiction, ordering that a person accused of a crime be held for trial, and either directing that he be sent to prison immediately, or admitting him to bail to secure his attendance at that time. The term "commitment" is also sometimes used of the sending a person to jail to enforce obedience of an order or decree of a court; but the term is most frequently used where the person is to be detained for some temporary purpose, as above indicated. It is seldom employed where the prisoner is finally sentenced to a term in prison as a punishment, after having been found guilty of a crime, in which case the judgment of the court is usually considered a sufficient warrant for the sheriff or proper authorities to carry out the sentence. See JUDGMENT; SENTENCE; SHERIFF; WARRANT.

COMMIT'TEE (Lat. *committere,* to intrust). A group of persons, rarely less than three, to whom an organized body, legislative or otherwise, intrusts or *commits* certain matters for investigation, consideration, and decision as to their meriting the attention of the whole body. A *standing committee* is one which exercises its functions permanently and considers all matters coming within a certain allotted sphere of action. In modern parliamentary practice immense importance attaches to the work of standing committees; and so true is this that modern legislation has been by some termed "government by committee." Almost every matter brought before such bodies as the United States Congress and the legislatures of the several States is at once referred to a standing committee, which holds meetings by itself, examines the subject closely, summons witnesses, if neces-

sary, and at length reports back to the main body its findings and conclusions, with recommendation to act favorably or adversely. The committee usually formulates its conclusions in a bill recommended to be passed if action is thought desirable. The same procedure is followed in the British Parliament. The United States House of Representatives has at least 60 committees; the Senate about 50; these consist of not less than three, and, except in one or two cases, not more than 15 members. The most important committees of the House are that of Ways and Means, which considers all matters relating to the tariff, internal taxation, and, generally, the revenues of the government, and that of Appropriations, which deals with all estimates of appropriations to be made by Congress and the framing of bills for that purpose. Other important standing committees are those of Banking and Currency, Foreign Affairs, Patents, Pensions, Judiciary, and Railways and Canals. Similar committees exist in the British Parliament. The argument in favor of the system of committees is the impossibility of a large deliberative body's examining every matter within the scope of its action in detail; the objection to it is the possibility of more easily corrupting or deceiving a small body than a large one; but whatever be the argument against it as a matter of theory, the committee system is fully recognized as a necessity and is too firmly intrenched in parliamentary practice to be successfully argued against. A *select committee* is one appointed at a special time to consider and report on a given topic; when this has been done, its powers and existence cease. The *committee of the whole* is the entire body sitting in a deliberative rather than a legislative character—for the purpose, that is, of debating and consulting upon the details of a question rather than of taking legislative action upon it. In the British House of Commons there is a regularly chosen chairman, other than the Speaker of the House, who presides over all committees of the whole; in the United States Congress any member may be chosen to preside in a committee of the whole. A *joint committee* is one made up of separate committees appointed by two bodies; in the United States, owing to the dual constitution of the legislatures, it is often necessary to appoint such joint committees to bring the two bodies to a mutual understanding and make harmonious action possible. In the national Congress such committees, known as *conference committees*, are almost always necessary to eliminate the discrepancies that arise in any important project of legislation in its passage through the two houses. Such committees are by tradition restricted to reporting for final passage only such parts of the project as appear in the measure as passed in either house.

In law, a committee is a person or persons appointed by a court having equity or probate jurisdiction to take charge of the person and manage the property and business affairs of an individual who is legally incompetent by reason of lunacy, idiocy, or habitual drunkenness. The duties are much similar to those of a guardian of an infant, and the committee is under the supervision and control of the court appointing him. He must file inventories and accounts, maintain all necessary actions in behalf of his charge, and apply the income, and the proceeds of the property itself if necessary, to the support of the incompetent and his family. If the incompetent recovers, he may apply to the court to have the committee discharged and resume his personal freedom and the control of his property. The power of the committee ceases at the death of the incompetent, and his estate is administered in the usual manner. See GUARDIAN; LUNATIC; HABITUAL DRUNKARD; IDIOCY.

The term is also employed to designate a person or persons appointed to take charge of specified matters by any body organized for governmental business or social purposes, and to make a report of the result of their efforts to the appointing power. See LEGISLATURE; PARLIAMENTARY LAW.

COMMITTEE, THE. A comedy, by Sir Robert Howard, published in 1665, but played for several years previously. In 1797 Knight brought out an adaptation of it under the title of *The Honest Thieves.*

COM'MODA'TUM. In the Roman law, an informal agreement for the return to the owner of a chattel gratuitously loaned to another. The return of the thing (*res*) loaned, or of its equivalent in quantity and quality, was enforced by a real action. In our law the commodatum has taken its place as a form of bailment (q.v.).

COMMODE, kō'mōd' (Fr., Commodus). A play by Thomas Corneille, played at the Louvre for Louis XIV in 1659.

COMMO'DIA'NUS. A Christian Latin poet, of the third century, supposed to have been of African extraction. His extant poems, *Instructiones per Litteras Versuum Primas* (80 pieces, in acrostic and telestic verse), and the *Carmen Apologeticum*, both of which are aimed against the heathen and the Jews, lack poetic fire and present few attractions as literary productions. Although some attempt is made to imitate the general rhythm of the hexameter, the author in reality employs a peculiar prosody, based partly on accent and partly on syllabic quantity. There is an edition by Dombart (Vienna, 1888), and an English prose translation of the *Instructiones*, in *Ante-Nicene Fathers* (Buffalo, 1886–96). See Teuffel, *History of Latin Literature* (Eng. trans., London, 1892).

COM'MODORE (probably from Sp. *comendador*, It. *comandatore*, OF. *commandeor*, Fr. *commandeur*, commander). Previous to 1862 the courtesy title "commodore" was given to all captains in the United States navy who had commanded a squadron, but no actual rank higher than that of captain existed. In July, 1862, the first captains to hold a higher office were commissioned as commodores. In 1882 the number of commodores on the active list was reduced from 25 to 10, and in 1899 the grade was abolished and the 10 commodores on the list promoted to the rank of rear admiral, the numbers in that grade being increased from 6 to 18. The title is now borne only by certain officers on the retired list and upon their death will become extinct. In the British navy captains having certain important commands are officially styled commodores (as the officer in command of the submarine flotilla), and have an increase of pay while on this duty, but there is no grade of commodore on the British Navy List. See ADMIRAL.

COM'MODUS, LUCIUS ÆLIUS AURELIUS. A Roman Emperor (180–192 A.D.). He was born in 161 A.D. and was the son of Marcus Aurelius Antoninus. Great pains were taken with his education, but to no purpose. When he was

summoned to the throne on his father's death (March 17, 180), he was successfully fighting the Marcomanni and other tribes on the upper Danube, but he hastily concluded a treaty with the barbarians and reached the capital in the autumn. The cruelty to which he was always prone was especially exhibited after a conspiracy by his sister Lucilla against his life had been discovered in 183. Nearly all who had risen to honor during his father's lifetime were sacrificed to appease his jealousy of the good and the great. Gross prodigality also marked his reign. He was proud of his physical strength and exhibited it in gladiatorial combats. For each of these exhibitions he charged the state an enormous sum. He used also to sing, dance, play, act the buffoon, the peddler, or the horse dealer. He demanded to be worshiped as a god and assumed the title of Hercules Romanus. Many unsuccessful plots were devised against his life. Finally, his mistress, Marcia, in concert with the prefect Lætus and the Imperial chamberlain, Eclectus, after they had failed in an attempt to poison him, caused him to be strangled by Narcissus, a famous athlete. The life of Commodus, written by Lampridius, is to be found in the so-called *Augusta Historia*. See AUGUSTAN HISTORY.

COM'MON (OF. *comun*, Fr. *commun*, from Lat. *communis*, OLat. *comoinis*, common). In the law of real property, the right of one person, in common with others, to take a profit, i.e., a thing of value, as the herbage or other produce or minerals or wild animals, from the land of another. The person over whose land the right is exercised may be a private owner or the state. The term is somewhat loosely employed as the equivalent of *profit à prendre* (q.v.); but such a "profit" may be exclusive or "several," in which case it is not properly characterized as a common. Blackstone, however, seems to use the term in this sense, and he enumerates four species of commons, viz., *common of pasture*, or the right of feeding one's beasts on another's land; *common of piscary*, or a liberty of fishing in another man's water; *common of turbary*, a liberty of digging turf upon another's ground; and *common of estovers*, a liberty of taking necessary wood, for the use of furniture of a house or farm, from off another's estate. These rights, with the various other *profits à prendre*, will be considered under that head. See also HEREDITAMENT; INCORPOREAL.

The term is often used to denote the common use of a piece of uninclosed ground possessed by all the inhabitants of a village or hamlet. The right of common is "disturbed," as the legal phrase is, when one who is not possessed of the right unlawfully infringes it, or when one possessed of the right exceeds his lawful use, or where one wrongfully prevents others possessed of the common right from exercising it, as where he incloses the land. In Great Britain the right of common was formerly possessed from time immemorial in almost every village with regard to certain pieces of land which were not held by any owner in fee, but might be fairly considered to belong to the community as a body. Statutes, both public and private, permitted the inclosing of such common land under various conditions, such as the consent of two-thirds of those exercising the right of common. By this legislation, and by acts of usurpation on the part of individuals, much of the common land has been lost; of late years the further inclosure of common land has been to some extent guarded against. In the United States the most frequent use of the term is as a substantive to denote a piece of ground set apart for public uses, such as open-air meetings, reviews, and for the general pleasure of the people at large. See PROPERTY, and the authorities there referred to.

COMMON, DOL. Subtle's mistress, in Ben Jonson's *Alchemist*.

COMMON, TENANCY IN. The most usual form of common ownership of lands or goods. It may be constituted of two or any greater number of persons, who may have equal or unequal shares, and whose titles and interests are distinct although undivided from those of their colleagues. Accordingly, while the tenant in common cannot claim any specific portion of the property as his own, he may, nevertheless, deal freely with his undivided share, alienating or devising it at his pleasure, or he may, by appropriate legal action, compel the partition of the property; whereupon, if it be divisible in fact, his share will be set off to him, as a separate parcel, in severalty. If it be not physically severable—as a mansion or a horse—the courts will direct its sale and the distribution of the proceeds among the several owners in the proportion of their respective interests. If the estate of a tenant in common be of an inheritable nature—as an estate in fee simple—it will, upon his death, descend, like his other real property, to his heirs. In the event of a conveyance or descent of such an interest the new holder simply takes the place of his grantor or ancestor and becomes a tenant in common with the surviving cotenants of the latter.

In its incidents the tenancy in common is at the present time not distinguishable from the estate which arose at common law by the descent of lands to two or more heirs who were entitled to share the estate. (See COPARCENARY.) Indeed, this is now in the United States the more usual method of creating a tenancy in common. It is, however, to be sharply distinguished from the other forms of common ownership, as joint tenancy, tenancy by entireties, and partnership, the two former of which are attended by the incident of survivorship, and the last of which is affected by the peculiar qualities of the partnership relation. In general, all tenants in common of a chattel or an estate are equally entitled to its possession and use, but the tenant for the time being in possession is protected by law from any forcible interference with his possession by his cotenant. The latter must wait for a "convenient" opportunity to secure the possession to which he is equally entitled.

At common law, upon a conveyance of lands to two or more persons without more being said, they took the property as joint tenants, and not as tenants in common. This presumption has generally been reversed by statute in modern times, and now such a grant will vest the property in the grantees as tenants in common, unless the deed declares that they are to take as joint tenants. See OWNERSHIP; PROPERTY; and the authorities there referred to.

COMMON ASSURANCE. The technical description of the ordinary processes for conveying the title to land. The term "assurance" was also employed, without the qualifying adjective, in such phrases as "a covenant to make further assurance" (meaning a covenant to protect the title conveyed by making or procuring the making of any further instrument which might be

necessary for that purpose), but the instrument or act of conveyance itself was always described as a common assurance. Blackstone defines common assurances as the legal evidences of the translation or transfer of real property, and comprehends under that description the four following modes of alienation: (1) by matter *in pais* or by deed; (2) by matter of record, or an assurance transacted in the King's public courts of record; (3) by special custom obtaining in some particular places and relating only to some particular species of property; (4) by devise.

By *matter in pais* is meant a transaction to be evidenced by witnesses before a jury, and it has reference to the old common-law method of conveyance by feoffment or livery of seisin. The deed referred to is the deed of grant, which has in modern times come to supersede most of the other modes of transfer. Alienation by *matter of record* includes assurance by private acts of Parliament, the King's grants, and the awkward processes by fictitious suit, known as common recovery and fine. Under alienation by *special custom*, Blackstone describes only the peculiar mode of conveyance "by surrender and admittance," whereby copyhold lands were transferred. *Devise* was employed in the same sense as that which it now bears, and included any gift of land, present or future, or of any interest in land, by last will and testament.

It will be noticed that these four modes of conveyance comprehend every form of voluntary alienation of real property, only involuntary alienations, as by forfeiture, escheat, bankruptcy, eminent domain, and the like, and the transmission of lands by descent, being omitted from the category of common assurances. See ALIENATION; CONVEYANCE; TITLE; and the names of the various common assurances referred to above. Consult the *Commentaries* of Blackstone, Stephen, and Kent, and the authorities referred to under CONVEYANCING and TITLE.

COMMON BENCH. The earlier name of the English Court of Common Pleas. See COMMON PLEAS, COURT OF.

COMMON CARRIER. See CARRIER, COMMON.

COMMON COUNCIL. The name usually applied to the local legislature in American cities. Usually a legislative body, so called, consists of only one chamber, but the term may be applied to a bicameral body as well as to one chamber in a bicameral assembly.

COMMON COUNTS. In law, in general, technical forms for stating a cause of action, used particularly in assumpsit (q.v.), in order to take advantage of proof which might vary from the particular facts and circumstances alleged and yet justify a recovery. Common counts were founded on an express or implied promise to pay money. Those in most general use were known as counts for "goods sold and delivered," "work, labor, and services," "money paid," "money had and received," "money lent," "account stated," and "use and occupation." Their names are somewhat descriptive of their purposes; thus, under the count "money had and received" the plaintiff could prove any circumstances under which the defendant received money which in law he ought to pay or return to the plaintiff. The money may have been obtained by fraud, but a fictitious promise to pay could be alleged, the fraud proved, and it was held the law implied a promise to pay on the part of the defendant. The common counts originated in England, but were abolished, together with all ancient forms of action, by the Judicature Acts. In the United States they are still used in some of the States where common-law pleading is retained, but in most States simpler and less technical forms of pleading have been substituted. See COMMON FORMS; PLEADING.

COM'MONER. In England, a term applied to all citizens except the hereditary nobility. John Hampden was called the "great commoner," and the title was also given to the elder Pitt before he was created Earl of Chatham. In Oxford University students of the second class who pay board are called "commoners," ranking between gentlemen commoners and bursars.

COMMON FEELING. See COMMON SENSATION.

COMMON FIELD SYSTEM. See OPEN FIELD SYSTEM.

COMMON FORMS. In law, the forms of personal actions in common-law pleading (each action having a general form of declaration or complaint), the allegations in which were usually fictitious, but which had a recognized meaning and which would be supported by a certain line of proof. Thus, in the action of trover (Fr. *trouver*, to find) it was alleged that the plaintiff lost a chattel and that the defendant found it, and this allegation could not be traversed or denied by the plaintiff, but plaintiff could prove any facts which in law would entitle him to the chattel and disregard the fiction of finding. These forms of pleading originated in the feudal period in England, and they arose out of the practice of granting a writ for trying the justice of some complaint for the redress of which there was no other provision in the law. The following forms of action were in general use: assumpsit, covenant, debt, detinue, replevin, trespass, trespass on the case, and trover (qq.v.). These forms were generally adopted in the United States, but have now in most of the States been superseded by simpler and less technical forms of action, usually through the enactment of codes of civil procedure. They have also been abolished in England by the Judicature Acts. See COMMON COUNTS; PLEADING.

COMMON LAW. The great body of English unwritten law (from which also is, in the main, derived the common law of the English colonies and of the United States), as distinguished from written or statutory law, from the Roman civil law, from international law, and from the systems of law administered by courts of equity and admiralty courts. Blackstone divides the civil law of England into the *lex scripta*, or statute law, and *lex non scripta*, or common law, and defines the latter as consisting of general customs, of particular customs prevailing in certain districts, and of certain laws used in particular courts. Common law is based primarily on customs growing out of the united wisdom and experience of mankind; these customs in time become recognized as reasonable, consistent, and established, are sanctioned by the courts, and are interpreted and made binding by the decisions of the final courts of appeal. While continental countries generally follow the carefully classified and codified system of the Roman civil law, the common law of England was a growth, gradual and in its origin complex—derived from the customs and precedents of Anglo-Saxons, of Normans, of the united England which followed the Norman rule, and including also some prin-

ciples and practices derived through various sources from the Roman law itself. It must be remembered that even at the time of the Norman Conquest England had a definitely established, though, of course, crude, legal system, and on that system much of the common law, though perhaps not the greater part, rests.

From its nature the common law cannot be sought in any one book or digest; its principles are discussed in the treatises of innumerable writers of textbooks and commentaries and in the records of the decisions of the courts. Commentators cannot make law, but they may discuss and record it. The real oracle of the common law is the judge, who considers and weighs precedents, measures them by the standard of reason and public policy, and sets finally the seal of authority upon them by his decision. Great importance, therefore, is attached to precedent in ascertaining the principles of the common law; it was, it is conceded, because too much importance was attached to precedent that, side by side with the system of common law, grew up, to correct and supplement it, a system of equity law. (See EQUITY.) On the other hand, the greatest jurists of the English bench have most widely recognized the fact that precedent must be tempered by reason. Lord Mansfield more than any other one judge, enlarged in this way the interpretation and application of common-law principles, insomuch that he was accused of assuming legislative rather than judicial powers. But there can be no question that his view, carried out with unswerving devotion to natural justice, to the necessities of growing and changing mercantile and legal conditions, and to the true fundamental principle of precedents, did much to make the administration of law in England pliable and efficient. We may illustrate the manner in which common custom became common law by citing the recognition by courts of the already long-established principle of primogeniture; of the similar recognition of the fact that the validity of a deed depends on its being sealed and delivered; of the recognition of the principle that wills should be less strictly construed than deeds; of the sanctioning the already existing mercantile custom that three days of grace should be given in payment of notes and bills. In all these cases the law did not make the custom or principle, but found it ready made to hand, recognized its convenience and usefulness, and sanctioned it by judicial authority.

Though based so firmly on custom and precedents, the common law is not totally inelastic. The continual growth of modern civilization, the progress of invention and manufactures, and the increased complexity of business—all have demanded from the common law recognition and an adaptation of the law to the conditions of the time. The rule generally followed as to precedents is that the courts shall always "abide by former precedents where the same points come again into litigation." But the decision of one of two courts of concurrent jurisdiction does not necessarily bind the other, nor will a new decision by a court of appeal always be supported by that very court in subsequent cases. It follows, therefore, that often precedents almost equal in number and authority may be quoted on both sides of a given question, and in such a case the power and authority of the court appealed to are called upon to decide as is consonant with justice and reason. In the United States, as each State has a final court of appeal, and as theoretically they are of equal authority, such a contradiction of precedents and decisions is frequent.

It is sometimes said that the United States, considered as one body politic, has no common law. It would, perhaps, be more accurate to say that, owing to the restricted character of the jurisdiction of the Federal courts, its common law is more indefinite and less completely developed than is that of the several States. This is largely due to the fact that, by Act of Congress, the Federal courts, when acting as common-law courts, are required generally, though not invariably, to follow the common law as it stands in the particular State where the action arises. As for the States themselves, the common law of England, as it existed at the time of the Revolution, together with such of its statutes as reasonably applied to the colonies, became at that time the common law of the States. In the United States, as in England, of course, the body of the common law has developed with growing industrial conditions, and has, on the other hand, been from time to time restricted by statutes of the States or of the United States. What we have said in regard to the common law of the States has one exception—Louisiana, which, when ceded to this country, retained in the main the system of French civil law already existing. The common law on a given point is always superseded by a statute covering that point. Thus, in the United States the order of authority of law is: the Federal Constitution; treaties with foreign powers; and acts of Congress; the constitution of the State; the statutes of the State; and finally the common law. When a statute is rescinded, the common law on that point again becomes of force, unless there be an older unrescinded statute, in which case that revives. For a sketch of common-law courts, pleading, etc., see COURT; PLEADING; ETC.

Bibliography. Consult: The commentaries of Blackstone, of Kent, of Stephen (13th ed., London, 1899), of Broom (9th ed., London, 1896); Coke, *First Part of the Institutes of the Laws of England; or a Commentary upon Littleton* (any edition); Pollock and Maitland, *History of the Laws of England* (2d ed., Boston, 1899); Stephen, *History of the Criminal Law of England* (London, 1883). For a statement of the elementary principles of the common law, consult Robinson, *Elementary Law* (Boston, 1882), and Minor, *Institutes of Common and Statute Law* (2d ed., Richmond, 1876–79).

COMMONPLACE BOOK. A sort of scrapbook for jotting down memoranda, occasional thoughts, or ideas for subsequent development. Southey, Dickens, and Charles Reade, among others, kept commonplace books, of which they made much use.

COMMON PLEA. A civil action between individuals, as distinguished from criminal proceedings, or other cases to which the government is a party. See CIVIL ACTION; PROSECUTION; COMMON PLEAS, COURT OF.

COMMON PLEAS, COURT OF. One of the great historic tribunals of the common law in England. It was instituted, as a separate jurisdiction, in the reign of Henry III, under the name of the Court of Common Bench, but its real origin lies further back, in the provision of Magna Charta that common pleas (*communia placita*) should no longer follow the

King's Court (*Curia Regis*) in its wanderings over the kingdom, but should be held in a fixed place (Magna Charta, 1217 s. 17). The rapid rise in power and influence of the court held by the King in person, or by his judges who attended him, combined with the necessity of bringing all causes, whether of a public or private nature, to the attention of a constantly moving court, constituted, for private suitors, a grave abuse. This was remedied by definitely establishing at Westminster, under the provision of the charter above referred to, a sufficient number of justices and barons of the King's Court to hear the private causes (common pleas) which could not conveniently follow the royal progresses. From this beginning down to the reform of the English judicature in 1875, the Court of Common Pleas at Westminster, as it was commonly called, shared with the Court of King's Bench the greater part of the common-law jurisdiction of England.

As distinguished from the King's Bench, the Court of Common Pleas was, as its title would seem to suggest, the popular and common court of the kingdom, having exclusive jurisdiction in all real actions, or suits relating to land, and in actions between private persons to try private rights; while the King's Bench was, for a long time at least, limited to pleas of the crown, i.e., public causes, and appeals from county courts and other inferior jurisdictions. This division of business threw upon the Common Bench the great mass of litigation, so that Sir Edward Coke called it "the lock and key of the common law," and Sir Orlando Bridgman described it as "the common shop for justice." The court was composed of a chief justice and as many common (or *puisne*) justices as the business of the court required. The number of these varied at different periods from four to eight. It was abolished by the Judicature Acts, 1873–75, and its functions transferred to the High Court of Judicature. See CURIA REGIS; COURT; EXCHEQUER; KING'S BENCH. The origin and history of the English courts of justice are concisely and accurately described by Inderwick, *The King's Peace: A Historical Sketch of English Law Courts* (London, and New York, 1895).

COMMON PRAYER BOOK. See PRAYER BOOK.

COMMON RECOVERY. At common law, a mode of alienation, or process for conveying land, through the medium of a fictitious suit in the superior courts of law. There is no reason to doubt the tradition, to which Blackstone has given the weight of his authority, that this method of conveyance was "invented by the ecclesiastics to elude the statutes of mortmain." Being incapable of taking land by feoffment or deed, there was nothing to prevent them from bringing a suit for the recovery of the land of a collusive donor, alleging that the title was in them, and if he thereupon made default, the judgment of the court in their favor operated to vest the title conclusively in them. In form it was a judicial determination that they were the owners of the land as against the defendant. In effect it was a device for enabling the defendant to transfer his interest in the land to them. Blackstone says, further, that after the invention of common recoveries they "were encouraged by the finesse of the courts of law in 12 Edw. IV in order to put an end to all fettered inheritances, and bar not only estates tail, but also all remainders and reversions expectant thereon." This refers to the famous struggle between the great landowners, seeking to tie up their estates in their families by entailing them on their issue and making them inalienable, and the lawyers and law courts, who aimed, in the interests of public policy, to defeat the attempt. The statute *De Donis Conditionalibus* (known also as the Statute of Westminster II), enacted by Parliament in 13 Edw. I (1285), provided that lands given to a man and the heirs of his body, known as conditional gifts, should not be alienable so as to defeat the inheritance of the issue therein nor so as to cut off the interests of those to whom the estate was to go upon the failure of such issue.

Several devices were tried to avoid the statute and break entails, but none of them was entirely successful until the year mentioned by Blackstone, 12 Edw. IV (1473), when, in the famous "Taltarum's Case," a common recovery was employed for the purpose. This proved to be entirely successful in barring the claims of the heir upon whom the lands were entailed, and, by a subsequent development of the action, all remainders and reversions dependent upon the fee tail were also cut off.

The process was too difficult and technical to be set forth at length here, but it may be briefly described as a collusive and fictitious suit, instituted by the person to whom the fee was to be conveyed (called the demandant) against the one who desired to bar the entail and convey the land (known as the tenant), by suing out a writ called a *præcipe quod reddat*, in which the demandant alleged that the tenant had no legal title to the land and that he, the demandant, had been turned out of it. The tenant defended the suit, but at a subsequent stage of the proceedings—which were in part conducted in open court—disappeared and had judgment rendered against him by default, and the lands were thus "recovered" by the demandant. This recovery, being a supposed adjudication of the rights of the parties, bound all persons and vested a free and absolute fee simple in the recoverer. The process was known as "suffering a common recovery." A similar but less difficult and somewhat less efficacious proceeding was known as "levying a fine." The fine was by statute, in the reign of Henry VIII, substituted for the more cumbrous and expensive common recovery as a means of barring entails, and both have now been superseded by simpler and more modern conveyances. Recoveries were occasionally employed in the early history of some of the United States, but are now everywhere obsolete, and in some States expressly abolished by statute. See FINE; COMMON ASSURANCE; CONVEYANCE; TITLE. The common recovery is fully described by Blackstone, *Commentaries on the Laws of England*, bk. ii, chap. 21. See also: Pigot, *Treatise of Common Recoveries: Their Nature and Use* (Dublin, 1792); Digby, *An Introduction to the History of the Law of Real Property* (5th ed., Oxford, Eng., 1900); Leake, *Elementary Digest of the Law of Property in Land* (London, 1874).

COMMONS. A name given to meals provided in English colleges and inns of court for their members. It is used occasionally in the United States for the college dining room when that is under college control.

COMMONS, HOUSE OF. See PARLIAMENT.

COMMONS, JOHN ROGERS (1862–). An American economist, born in Hollandsburg, Ohio. He graduated at Oberlin College in 1888 and studied at Johns Hopkins University; taught economics at Wesleyan (1890), and sociology at Oberlin (1892), Indiana University (1893–95), and Syracuse University (1895–99); and in 1904 became professor of political economy in the University of Wisconsin and director of the American Bureau of Industrial Research. In 1911 he was appointed a member of the Wisconsin Industrial Commission; and in 1913 he published a report of the work of the Milwaukee Bureau of Economy and Efficiency. He wrote: *The Distribution of Wealth* (1893); *Proportional Representation* (1896; revised, 1907); *Trade Unionism and Labor Problems* (1905); *Races and Immigrants in America* (1907); *Labor and Administration* (1913). He was one of the editors of *A Documentary History of American Industrial Society* (1910).

COMMON SCHOOLS. Since instruction has, at least in modern times, been provided for the great majority of the people, the term "common schools" implies that the schools are for the masses of the people, or, where class distinctions are drawn, for the common people. The term, as used in the United States, implies, as well, that such schools are supported and controlled by the people and charge no tuition. The latter characteristic is now true for the most part of the common schools of Europe. The details of all such systems of schools are given in the article on NATIONAL EDUCATION, SYSTEMS OF.

Previous to the beginning of modern history no people ever contemplated the education of the masses, though with most ancient peoples, as well as during the greater part of the Middle Ages, there were schools that provided the rudiments of education for a limited class. With the Greeks and Romans this class was not a special educational class, the priesthood, as with most other ancient peoples, but included all those entitled to full citizenship. At Athens the elementary schools were private and taught gymnastics and music, the latter including reading and writing. At Rome the elementary schools were introduced at a much later date than at Athens, were also private, and gave instruction in reading, writing, and calculation. During the Middle Ages such educational efforts as were made were wholly under the auspices of the church. Schools were established and maintained by the church, until the Renaissance of the twelfth century. The mediæval schools were either singing or grammar schools. The former were the elementary schools and were designed primarily for training boys to assist in the church service. A rudimentary knowledge of reading, and often of writing, Latin, as well as instruction in singing, was given. Such schools were very numerous before the Reformation, but how numerous or how extensive is a question which research in educational history has not yet determined. In the large commercial and industrial cities of northern Europe private schools for teaching the three R's and some commercial subjects sprang up in the thirteenth and fourteenth centuries. But it is certain that after the Reformation a new impetus was given, both in Protestant and Catholic countries, to the establishment of common schools—in the one case by church and state, in the other by new teaching orders.

Until the middle of the eighteenth century the common schools still remained almost entirely under ecclesiastical direction. Later they were secularized, and attendance made compulsory. This was first accomplished on a large scale by Prussia in the latter half of the eighteenth century. In France the system of public elementary schools under the control of the state has been developed since 1833. In Scotland common schools have existed very generally since the latter part of the seventeenth century, though it was not until 1872 that these were placed entirely under the control of the state and attendance made compulsory. English common schools on any extensive scale date from the opening of the nineteenth century, and only since 1870 has there been any concerted governmental effort towards building up a common-school system.

In the United States common schools were early established in most of the colonies. Often these were private schools taught by some woman as a means of support. They were consequently called, as in England, dame schools, or sometimes, from the place where held, kitchen schools. The early colonists, however, gave greater attention to the founding of secondary or grammar schools as being of more immediate importance in the education of a ministry, this forming the chief motive to an education with them. In 1642 Massachusetts required that every township containing 50 families should have a school for all the children, the tuition to be paid either by their parents or by general provision. While in New England such common schools became free in the sense of charging no tuition during the latter part of the seventeenth century, in most of the United States the free common school is a development of the second quarter of the nineteenth century. During and since that time the system of free common schools has been systematically extended throughout all the States and Territories, and the course of instruction has been greatly enlarged. As each State has control of its own schools, there is great variety in the details of their management, but the following leading principles are the same in all: (1) a system of graded schools, embracing primary, grammar, and high schools; (2) State superintendents, who determine by examinations the qualifications of the teachers and watch over the efficiency of the instruction given; (3) uniformity of textbooks; (4) public examinations; (5) school libraries and illustrative apparatus, and in many cases textbooks supplied at public expense; (6) improved construction and furnishing of schoolhouses; (7) access to the school for all children of suitable age; (8) normal schools for the training of teachers. Some of the States have funds to aid them in supporting their schools. In the West these funds are generally large, arising from the sale of lands granted by the general government and in some instances also by the State. Such grants by the United States for school purposes amount to 68,000,000 acres, valued at more than $100,000,000. Before the Civil War there was no general and well-ordered system of common schools in the Southern States. But in their new constitutions they have made pro-

vision for them and are now pressing forward the work. In 1867 a National Bureau of Education (see EDUCATION, COMMISSIONER OF) was established by Congress for the purpose of collecting statistics and diffusing information on the whole subject, so as to aid the people of the United States in the adoption and support of the best school systems and to advance in other ways the cause of education throughout the land.

While the Massachusetts school law of 1647 had a compulsory feature, no effective system of compulsory education was ever adopted in the United States before the reform in Massachusetts that resulted from the efforts of Horace Mann (q.v.). At present (1914), 42 States, and the District of Colombia, the exceptions being in the South, have laws making education compulsory, either at a public or an approved private school. In 1910–11 there were 18,035,118 children enrolled in the common schools of the United States, out of a total of 19,636,230 enrolled in all the schools. The enrollment in the common schools is about 73 out of every 100 children of school age. The average length of the period of attendance was 101.8 days out of a total length of 156.8 days for the school term. There were more than 533,500 teachers engaged in the common schools, and the total expense of such schools was $446,726,929. See EDUCATION; NATIONAL EDUCATION, SYSTEMS OF.

COMMON SCOLD. One who, by the practice of habitual scolding, disturbs the peace of the neighborhood. Scolding, in itself, is not obnoxious to the law, and, so long as it is confined to the domestic hearth, it is *damnum absque injuria*, no matter how persistent and violent it may be. It is only when the practice is indulged in public and with such frequency and under such circumstances as to threaten a breach of the peace that it becomes a public nuisance and punishable as such. The common law took cognizance of the offense and resorted to various devices, mostly of an unpleasant nature, for the punishment of those convicted of it. Among these punishments were the stocks (q.v.), the ducking stool (q.v.), and the branks (q.v.), the last named being, during the period of its application, the most efficacious. The practice of punishing common scolds survives, sporadically, in the United States, in some of which it is recognized in the penal statutes, but the punishment has been mitigated to fine and imprisonment. Consult the authorities referred to under the title CRIMINAL LAW.

COMMON SENSATION, or COMMON FEELING. A collective name for the sensations which make up our general sense of bodily health or ill health, well-being or ill-being. It includes, e.g., the diffused sensations of the tactual sense: shuddering, shivering, tingling, tickling, creeping, goose flesh, pricking, pins and needles; sensations which can in many cases be set up as concomitant sensations to squeaking or sawing noises and the like. (See references under ANTIPATHY.) It includes, further, dizziness (see STATIC SENSE); the sensations of muscular exertion and fatigue; and the muscular and organic pains. Indeed, on the theory that pain is aroused by overintensive stimulation of any and every sensory nerve (Wundt, *Phys. Psych.*, 1910), pain would be, literally, a sensation "common" to the whole sensitive organism. Sometimes the two sensations of temperature are called common or general sensations; and the alimentary sensations of hunger, thirst, and nausea, as well as the respiratory sensations of stuffiness, of a "bracing" air, etc., are also covered by the term. It is clear that the phrases "common sensation," "common feeling," "general sense," belong to a psychology that had not yet succeeded in analyzing the more massive complexes of organic sensations and in referring them to specific organs within the body. In the present state of our knowledge there is no reason for their retention. Consult Kuelpe, *Outlines of Psychology* (London, 1909), and Titchener, *Text-Book of Psychology* (New York, 1910). See CUTANEOUS SENSATION; ORGANIC SENSATION.

COMMON SENSE. A pamphlet by Thomas Paine, published in Philadelphia, 1776, advocating the separation of the United States from England. It was thought of sufficient importance at the time to receive public notice from General Washington.

COMMON SENSE, THE PHILOSOPHY OF. There are certain beliefs that have been supposed to be current among men in all ages. Of these, illustrations are found in the belief in an external, material world, independent of any mind to perceive it, in the universality of causality, and in the eternal obligation of morality. Every man of common sense, it is held, shares such beliefs. The philosophical acceptance of these beliefs as self-evident and beyond the reach of criticism is called common-sense philosophy. (See also DOGMATISM.) Thomas Reid (q.v.) was the most distinguished advocate of common sense as the final court of appeal on all matters philosophical, and he has been generally followed more or less closely by the philosophers of the Scottish school. (See SCOTTISH SCHOOL OF PHILOSOPHY.) The untenability of this position is realized as soon as it is recognized that common opinion has often been shown to be mistaken. Common sense is the starting point of philosophy, but not its final arbiter. And yet we find in the history of philosophy that there is a strong tendency, on the part even of independent thinkers, to make their views appear as those of the ordinary man. Thus Berkeley (q.v.) claimed that his idealism was in accord with common sense. This constant attempt of the philosopher to square himself with common sense shows the strong hold that popular belief has even upon the most original thinkers. Consult: Seth, *Scottish Philosophy* (Edinburgh and London, 1890); McCosh, *Scottish Philosophy from Hutcheson to Hamilton* (London and New York, 1875); Sidgwick, "The Philosophy of Common Sense," in *Mind*, N. S., vol. iv (London, 1895). See KNOWLEDGE, THEORY OF.

COMMON TIME. See TIME.

COM'MONWEALTH' OF AUSTRA'LIA. The federal union of the self-governing states of Australia, set up by Act of Parliament July 9, 1900, and proclaimed at Sydney, Jan. 1, 1901. See AUSTRALIAN FEDERATION.

COMMONWEALTH OF ENGLAND. The official designation of the government of England from the abolition of the monarchy, February, 1649, until the establishment of Cromwell's Protectorate, December, 1653. The title is generally applied to the whole period dating from the death of Charles I, Jan. 30, 1649, to

the restoration of Charles II, May 29, 1660. See CROMWELL, OLIVER.

COMMUNE' (Fr., district, from ML. *communa, communia,* district, from Lat. *communis,* common). The smallest administrative division of France and the unit of local self-government. The commune is a legal body and can buy and sell property, contract debts, and appear in the courts. The chief magistrate is the *maire* (mayor), who is assisted by one or more deputies and a deliberative assembly, called the *conseil municipal.* The *maire* unites in himself two general classes of functions resulting from the twofold nature of the commune. As the agent of the national government, he is charged with the local promulgation and enforcement of laws and decrees; and, as a member of the municipality, he has to attend to the police, the revenue, and the public works of the commune, and in general to act as the representative of the corporation. In communes which rank as the administrative centres of a department, arrondissement, or canton, or which have a population of more than 3000, the *maire* is nominated by the central government; elsewhere the appointment is made by the prefect of the department. The councilors are elected by the votes of the communal electors and hold office for five years.

COMMUNE. A term applied in feudal times to a body of burghers holding a charter granting them certain privileges of self-government. These communes were found in France, England, Italy, and elsewhere. On the character of these mediæval communes, consult Schröder, *Lehrbuch der deutschen Rechtsgeschichte* (Leipzig, 1907).

Commune of Paris (1792). The revolutionary municipal government established in Paris in August, 1792. It acquired immediate ascendancy in the Assembly, through the personal pressure its leaders could bring to bear, and as its power increased it became more and more the instrument of the violent element of the Revolution and dictated the policy of France. Its history became the history of the Revolution itself. On this commune consult Morse-Stephens, *History of the French Revolution,* vol. ii.

Commune of Paris (1871). This is commonly referred to when the term is used without qualification. It was the insurrectionary body, or organized mob, which was in possession and control of Paris from March 18 to May 27. The German army of occupation left Paris March 3, and almost immediately signs of revolt appeared. On the 18th the Reds, as the Communists were called, with the encouragement of the Internationale (q.v.), rose against the French regular troops and, supported by the National Guard, took possession of the city. Generals Lecomte and Clément Thomas were shot. Communal elections were held, and the authority of the National Assembly, which was sitting at Versailles, was declared null. Peace negotiations with Germany were held in abeyance until the new national government could establish its authority in France, and it was intimated that Germany might find it necessary to reoccupy the abandoned fortresses. Large bodies of the French prisoners held by Germany were released to reinforce the army at the disposal of the government for the suppression of the insurrection. The army was thus raised to 150,000 men, and on April 6 active operations were begun by the government forces, under Marshal MacMahon, for the capture of Paris. The military administration of the Commune was notoriously incompetent, and insubordination and debauchery rendered the forces inefficient, but the available number of the National Guard approximated 100,000, and they were well armed and possessed strong fortifications, the reduction of which was not a light task. The siege of the city was pushed with energy, for the credit of the new Republican government of France before the world hung upon its ability to maintain its authority. Before the middle of May it became evident that the Commune could not hold out much longer, and its followers began to resort to acts of vandalism. The residence and library of Thiers were destroyed, and the Vendôme Column pulled down. The government forces penetrated the defenses of the city on May 21 and obtained possession of Montmartre and now was enacted that saturnalia of violence and crime which has made the name of the Commune infamous. On May 24 the Communists set fire to the public buildings, the palace of the Tuileries being destroyed. On the same day a large number of hostages, including M. Darboy, Archbishop of Paris, were massacred. On May 27 the last hand-to-hand struggle, without quarter, was fought in the cemetery of Père-Lachaise. On the following day all resistance came to an end, and the reign of the Commune was closed. The Communal Council, the governing body of the Commune, was organized in 10 committees, of which that for finance was the most efficient. At the head was a general executive committee, the authority of which was never great. It was displaced by a committee of public safety, which was expected to exercise dictatorial power, like its Revolutionary prototype; but this, too, proved a failure. The Commune was essentially lawless. Many of those who initiated the movement were honest theorists and enthusiasts, but the forces they called into action were entirely beyond their control. There is no scientific history of the Commune. The principal work is Du Camp, *Les convulsions de Paris* (4 vols., Paris, 1878–79), conservative. Of Communist sympathies are Arnould, *Histoire populaire et parlementaire de la Commune de Paris* (3 vols., Brussels, 1878), and Lissagaray, *Histoire de la Commune* (last ed., Paris, 1896); there is an English translation by Aveling of an earlier edition (1886). Consult also Washburne, *Recollections of a Minister to France* (2 vols., New York, 1887); Simon, *The Government of M. Thiers* (2 vols., ib., 1878); Fetridge, *Rise and Fall of the Paris Commune of 1871* (ib., 1871); March, *History of the Commune of 1871* (London, 1896); Margueritte, *La commune* (Paris, 1904). See FRANCE; FRANCO-GERMAN WAR.

COMMU'NICA'TIO ID'IOM'ATUM (Lat., communication of peculiar properties). A term of ancient, and also of Lutheran, Christology, denoting that each of the two natures of Christ, divine and human, imparts its peculiar properties to the other, so that the properties of the divine Word can be ascribed to the human Christ, and the human properties to the divine Christ. Consult Thomasius, *Die Christliche Dogmengeschichte,* vol. ii (Erlangen, 1874–76). See CHRISTOLOGY.

COMMUNICATION, CONFIDENTIAL OR PRIVILEGED. See PRIVILEGED COMMUNICATION.

COMMU'NION (Lat. *communio*, participation, from *communis*, common). In ecclesiastical language, that relation, involving mutual claims and duties, in which those stand who are united by uniformity of belief in one religious body or church. To exclude from this relation and its involved rights is to *excommunicate*. The most visible symbol of this relation being the partaking together of the Lord's Supper, that rite is often called the Communion. See LORD'S SUPPER; and, for communion table, ALTAR.

COMMUNION IN BOTH KINDS. A term of theology, implying that, in the celebration of the Lord's Supper, communicants partake of both the bread and the wine. It is universally acknowledged that in the primitive Church both the bread and the cup were distributed to all who communed. Sects which, like the Manichæans, discarded the wine, were condemned as irregular. Early popes commanded the use of both kinds (e.g., Gelasius I, 492–496). As, however, there was frequent occasion to carry the consecrated elements from the church to sick persons at their homes, it became customary, for convenience, to dip the bread in the wine, administering in this way both in one. As early as the third century communion of the sick seems to have often been with bread only. In the thirteenth century Robert Pulleyn, of Oxford, approved the custom of giving to the laity the bread only, in order, as was said, to avoid the danger of spilling the wine. This view was adopted by the scholastic theologians, who taught that Christ was wholly present in the sacrament under either form, and that, consequently, one form was sufficient for a valid observance of it. Thomas Aquinas and Bonaventura, especially, advocated the administration of the communion under one form only. As this view predominated in the course of time, it became the practice of the Church in the West to withhold the cup from the laity. Against this the heretics of the Middle Ages, as the Waldenses, and especially the Hussite sect of Calixtines (Utraquists), protested, but the Council of Constance defended the custom. The Protestant churches were united in regarding the communion in both kinds as essential to the right observance of the ordinance. The practice of the Roman Catholic church was confirmed and made binding by the Council of Trent in 1563. It is defended on the ground that the cup is not necessary to the completeness of the sacrament. Since the whole Christ, as to His body, soul, and divinity, is not only in each species, but in every particle of both, he who receives the consecrated bread receives the whole Christ. See LORD'S SUPPER.

COM'MUNISM (Fr. *communisme*, from *commun*, joint, common, from Lat. *communis*, common). A system of society in which private property, at any rate, in the means of production is abolished and all or practically all goods are held in common, the needs of each individual being supplied from public sources. Communism, in its broadest sense, is the economic basis of socialism (q.v.). It is also the economic basis of anarchism (q.v.). The term is, however, usually restricted to various non-political communities organized on a basis of common ownership and to the principles upon which they rest. Communism in this sense was an early form of economic organization; in most parts of the world it probably antedated private property and still survives in many primitive societies. The Russian Mir is in large measure a communistic organization. Primitive communism was often kept alive, after the introduction of private property, by religious organizations. In ancient Palestine the Essenes and Therapeutæ held property in common. Much is said about the communism of the early Christians. A certain degree of it existed, but it seems not to have been universal, many Christians retaining their private property. In any case the institution did not long endure. The ascetic tendencies which often manifested themselves in communistic forms among heretical and orthodox sects were introduced into the West from the East. Before an inquisition at Turin in 1030 a heretic declared: "We hold all our goods in common with all men." Other heretical sects, the Catharists (eleventh century) and the Apostles (thirteenth century), held similar views. The Brothers and Sisters of the Free Spirit held that, before the fall, men were like God, that paradise must be reintroduced with community of goods and of women. Many evil stories are told of their proceedings, and they were opposed by the Inquisition, but spread in secret during the fourteenth and fifteenth centuries. With these may be compared the Adamites of the fifteenth century. The great monastic orders also present many communistic traits.

During the fifteenth and sixteenth centuries the Taborites (Hussites), the Moravians, and the Anabaptists arose and flourished in succession in central Europe. (For detailed descriptions, the reader is referred to separate articles under these heads.) The teachings of the Anabaptists were embodied, in Thuringia, in a popular movement to realize a state without government, law, or property, each to receive according to need, "omnia simul communia." This and the attempt at Münster to establish the new Zion were forcibly put down. Communistic societies with a religious basis were formed in considerable numbers in eighteenth-century Europe and became still more numerous in the nineteenth century, especially in America, many of them still surviving. The later communities, however, drew their inspiration from the philosophic social reformers, or Utopists, as well as from religion.

Of philosophic utopianism the first important example is the ideal republic of Plato. In Plato's state political functions were to be restricted to the two upper classes, the philosophers and the guardians. Among these Plato proposed that community of wives and wealth should be the rule, in order that the disorders attendant upon a régime of private interest might be obviated. Plato's scheme was far from communism in its present meaning, since the middle class of traders and artisans were to retain private property and the institution of the monogamic family, and since it premised the existence of slavery. Its influence upon modern communism was exerted through the work of Plato's imitators, Sir Thomas More and Thomas Campanella. More, influenced by Plato, proposed to retain slavery, the slaves being chiefly convicted criminals. There should be community of goods; every one should be supplied from the state storehouses. Monogamy is prescribed, and the greatest freedom allowed the individual families. Men and women are to work six hours per day. The title of More's book *Utopia* has given the name to all such pro-

posals. More has been followed by many writers. Campanella (*Civitas Solis*, Frankfort, 1623) advocated community of goods and of women, with universal duty to labor four hours a day, each person to be provided according to need. Vairasse (*Histoire des Severambes*, 1677) proposed an eight-hour working day. Among the most interested Utopistic efforts is the charming story by Cabet, *Voyage en Icarie* (1842), in which monogamy is preserved, each person working according to ability and receiving an equal reward. Cabet's attempts to realize his dreams will be mentioned later. Bellamy (*Looking Backward*, 1888) advocated wages in the form of annual credits at the public warehouse, at which goods are sold according to the quantity of labor required in their production. Hertzka (*Freiland*, Leipzig, 1890) and Sheldon (*In His Steps*, 1899) may also be classed here, as well as H. G. Wells, *A Modern Utopia* (1905). The work of Wells is especially interesting in that it represents a reaction towards an aristocratic communism. Administrative functions, in Wells's scheme, are concentrated in a body of "Samurai," bearing important analogies to Plato's upper classes of philosophers and guardians.

Mention should also be made of certain critics of the system of private enterprise who proposed communism as a remedy for its evils, although they did not elaborate ideal plans of social reorganization. Among these was Meslier (1664–1729). In his *Testament* (published in 1864) Meslier described society as a product of force, and its evils as the results, largely, of private property. The various parishes should form large families bound mutually to assist one another, each individual to have according to his needs. Morelly (*Code de la Nature*, 1755) advocated communities of about 1000 persons with common goods and distribution according to need.

The Utopists were essentially romancers and made no effort towards the realization of their ideals in practical institutions. A practical movement in the direction of communism was instituted in France by Saint-Simon and Fourier. Fourier's plan of organization, while providing for life and labor in common, sought to preserve the essentials of private property. With Louis Blanc, French communism assumed practically the character of socialism, relying upon the state rather than upon coöperative effort to effect social reform.

Among the leaders of the communistic movement in the early nineteenth century perhaps the greatest was Robert Owen. At the outset of his career Owen was merely a philanthropic manufacturer who believed that the lot of the worker could be rendered quite tolerable at no ultimate cost to other classes in society. Later he was forced to the conclusion that reforms under the existing economic system could give only temporary relief, and advocated the formation of coöperative groups of 500 to 1000 persons, owning land and tools in common and sharing the products of labor according to need. Such groups, or colonies, he believed, would be so efficient, and life in them would be so agreeable, that all workmen would desert to them, and the existing industrial system would break down of itself. In 1819 he attempted to start such a colony at Motherwell, but the funds were not sufficient. In 1824 Owen came to America, where his presence did much to start a wave of communistic thought, and where some 14 colonies were planted, none of which lasted more than a few years. During his absence (1826) some of his friends purchased 291 acres of land at Orbiston, near Glasgow, and built a large building in which all should live, each sharing in the division according to his labors. The death of one of the founders, with other difficulties, brought an end to the plan. Similar colonies at Rahaline, in the thirties, and Queenswood (1841) likewise failed, the latter after five years' existence.

Communistic Societies in America. The conditions of economic life in the United States have been especially favorable to the foundation of communistic societies, both social and religious. Cheap land and freedom from hampering political regulations have been the chief favoring conditions. In 1774, driven by religious opposition, "Mother Ann Lee" came from England with a small company of Quakers, who were called Shaking Quakers because of certain physical movements in religious exercises. The name was soon shortened to Shakers. They settled at Watervliet, near Albany, N. Y. Mother Ann died in 1784. In 1787 a covenant was adopted establishing celibacy and community of goods. Their communism grew out of their religion. Christianity, they say, does not admit of divisions into rich and poor; "mine" becomes "ours," and riches and poverty, with their misery, disappear. The Shakers have lived happily and contentedly and have had great material prosperity. They have now some 15 societies in different States, the largest being at Mount Lebanon, N. Y. They number about 700 and own much land. Their aggregate property has been estimated at $10,000,000, but it is not managed so as to yield considerable returns. (See SHAKERS.) The Harmonists, or Separatists, as they were called in Germany, left the Fatherland because of sectarian opposition and settled in 1803 at Harmony, Pa., under the leadership of George Rapp. They, too, have been very successful financially. At one time they had 1000 members, but now less than five remain. They employ outsiders to carry on their enterprises, so that they have practically become a close corporation. See HARMONISTS.

The Amana Community of seven villages in Iowa was founded by another German sect, the Inspirationists, who settled near Buffalo, N. Y., in 1842, moving to Iowa in 1855. Religion is the primary thing. They have prospered and possess fertile and well-improved lands. They number 1700 or more. (See AMANA.) In 1844 Dr. Keil founded the Bethel Community in Shelby Co., Mo. The community prospered, numbering at one time 1000 members, and formed several branch communities in the same State. It was dissolved in 1880, but some of the members removed to Oregon, where Dr. Keil had formed another community known as Aurora. This colony, however, was also dissolved in 1881. Under the leadership of Cabet a large group of French communists attempted in 1848 to form a community in Texas and later in Illinois. They were finally settled at Icaria, Iowa, where they prospered for many years, but were disbanded in 1895. See ICARIANS.

All of these communities were started by foreigners, though most of the Shakers have been Americans. An American colony of some 50 members was started by John Humphrey Noyes in 1848 at Oneida, N. Y. Later a small branch

was established at Wallingford, Conn. They believed in freedom from sin and were called "Perfectionists" (q.v.). Between 1840 and 1850, under the leadership of Albert Brisbane, Horace Greeley, Charles A. Dana, and others, Fourierism spread over the country, Greeley advocating it in the New York *Tribune*. Some 27 "phalanxes" were started in various places, most of which were short-lived. The most famous was Brook Farm (q.v.). The North American Phalanx, in Monmouth Co., N. J., was the most successful, lasting some 12 years (1843–56). Ripon, Wis., dates back to the Wisconsin Phalanx of 1844. This association paid $1.08 on the dollar when it dissolved.

In recent years a number of attempts to found communistic settlements have been made. Among these may be mentioned Ruskin Cooperative Colony, founded in 1894 and closed in 1902; the Christian Commonwealth of Georgia (1896–1900); the Freedom Colony of Kansas (1897–1905); Equality (Wash.), founded by the Brotherhood of the Coöperative Commonwealth in 1895, the name being changed to Freeland in 1905. Lack of unity and unwise management have been the chief reasons for the failure of communistic societies. The communities having the longest life have all been under the influence of religious ideals powerful enough to check dissension. Of such communities Ephrata, the Harmonists, and the Shakers have existed over a century. Of the religious communistic societies that have disbanded, the average life has been about 24 years; the Owenite societies lived on an average less than a year and a half; the Fourieristic societies, two years and a half. Societies organized in the last 25 years have endured, on an average, four years. A common cause of the failure of religious communities has been the death of the founder and failure to find another religious leader with personality sufficiently powerful to check the growth of discontent. Contrary to popular belief, the communistic societies of the last century have been troubled very little by idlers. Nor has great difficulty arisen over the apportionment of tasks. Troubles that have arisen are of a more purely personal nature: discontent with leaders, restiveness under discipline. In many communities the secession of the young, attracted away by opportunities for individual success, has been a chief cause of ultimate failure. Some of the most successful communities have been celibate, as, e.g., the Shakers, and have found increasing difficulty in securing enthusiastic recruits with the change in the spirit of the times.

The failure of most communistic societies and the very moderate success of those that survive are frequently assumed to be proof of the impracticability of any scheme of communistic organization. Socialists urge that no conclusions can be drawn from the experience of such societies. Economically they hark back to primitive conditions. They seek to be as nearly self-sufficing as possible; they make little use of modern improvements in production, and hence labor hard for small results; they attempt to cultivate asceticism, as a rule, and hence life in them becomes irksome to those who are not bound to them by strong religious convictions. The communism desired by modern socialists is that of a great state, not that of a petty community. There is no reason why a communistic state should not employ all known improvements in production, nor why life in it should be narrow and ascetic. Furthermore, a communistic state might keep within it the abler and more enterprising spirits, but a small communistic group cannot keep these from drifting away.

Bibliography. Consult Kautsky, *Communism in Central Europe at the Time of the Reformation* (London, 1897); Stammhammer, *Bibliographie des Sozialismus und Kommunismus* (Jena, 1893–99); Stegman-Hugo, *Handbuch des Sozialismus* (Zurich, 1897); Ely, *French and German Socialism* (New York, 1883); Nordhoff, *The Communistic Societies of the United States* (ib., 1875); Ely, *The Labor Movement in America* (2d ed., ib., 1890); Noyes, *History of American Socialisms* (Philadelphia, 1869); Shaw, *Icaria* (New York, 1884); Lockwood, *The New Harmony Communities* (Marion, Ind., 1902); Bushee, "Communistic Societies in the United States," in *Political Science Quarterly* (Boston, 1905); Hinds, *American Communities* (Chicago, 1908). See SOCIALISM.

COM'MUNIS'TIC SOCIETIES. See COMMUNISM; also AMANA; BROOK FARM; EPHRATA; KORESHAN ECCLESIA; PERFECTIONISTS; SEPARATISTS; SHAKERS; ZOAR COMMUNITY.

COMMU'NITY OF PROPERTY. In the civil law, a form of partnership or common ownership of property by husband and wife. It covers all personal property owned by either party before marriage or acquired during marriage, all realty and all profits and rents acquired or accruing during marriage. Property given to either by deed of gift in which the donor specifically makes it the exclusive property of the donee is exempt from the operation of the doctrine. The survivor takes one-half the property after their joint debts are paid and also has certain homestead rights. The heirs of the deceased spouse take the remaining half, subject to the survivor's homestead rights. This doctrine was introduced from the French and Spanish law into some of the southern and western States, including Louisiana, Washington, Texas, and California, but is generally regulated and somewhat modified by statutes. (See HUSBAND AND WIFE; GANANCIAL SYSTEM.) The expression "community property" is sometimes used to describe the holding of property in common by communistic societies, such as the Shakers. In such communities there is a sort of general partnership in all property, each adult individual owning an equal share by virtue of his membership. The ownership is in the nature of a tenancy in common and is not subject to the rules of the civil law above described.

COM'MUTA'TIONS. A military term. See ALLOWANCE; PAY AND ALLOWANCES.

COMMU'TATIVE LAW. See ASSOCIATIVE LAW.

COM'MUTA'TOR. See DYNAMO-ELECTRIC MACHINERY.

COMNE'NUS (Lat., from Gk. Κομνηνός, *Komnēnos*). The name of a family, originally from Paphlagonia, of which several members occupied the throne of the Byzantine Empire, from 1057 to 1204, and that of Trebizond, from 1204 to 1461. After the fall of Constantinople one branch of the family settled in Saxony, another in Corsica; but the attempt which has been made to trace the descent of the Bonaparte family from a branch of the Comneni is not supported by valid evidence. See ALEXIS; ANNA COMNENA; BYZANTINE EMPIRE.

CO'MO (Lat. *Comum*). The capital of the province of the same name in Lombardy, north Italy, picturesquely situated at the southwestern end of Lake Como, at a distance of 28 miles north of Milan (Map: Italy, D 2). The old town is surrounded by walls which form a rectangle as in Roman times. The city is surrounded by garden-covered hills and groves and contains some very beautiful buildings. The marble cathedral, begun in 1386, belongs to different periods and is built in many styles. Begun in the Gothic at the end of the fourteenth century, the larger portion was constructed in fifteenth-century Renaissance style, mostly by Rodari, while the dome is of relatively recent origin. The interior is decorated with rare pictures and monuments; in the main entrance are placed two statues of Pliny the Elder and the Younger, natives of Como. The basilica of S. Abondio, a building of Lombard origin, rebuilt in the eleventh century and recently restored, dates from the eleventh century. Near by is the church of S. Carpoforo, also the ruined castle of Baradello. The church of Santissima Annunziata, situated on the promenade outside of the town, is also remarkable for its rich decorations of marble and gold. Adjoining the cathedral is the city hall, a large, arcaded structure, built of different-colored stone, and completed in 1215. Other noteworthy buildings are the theatre, built in 1813; the lyceum, founded in 1824; and the city museum, opened in 1897, with its collections of Roman antiquities, arms, and coins. Since the early Christian era it has been a suburban resort. Como has extensive manufactures of silk, velvet, knit ware, optical glasses, shoes, stockings, and metal work. The commerce is also of considerable importance.

The ancient Comum was a city of the Insubres, occupied by the Romans in 196 B.C., and colonized by Cæsar as a military post to repress the Alpine tribes. In the Middle Ages it was a stronghold of the Ghibellines and the "open door of the emperors into Italy." In 1127 it was destroyed by the Milanese and rebuilt by Frederick I in 1159. Later it was ruled by the Rusca family and in 1335 came into the possession of the Visconti, from which time it shared the fortunes of Milan. In 1859 it was a centre of the agitation headed by Garibaldi.

Como is the seat of a bishop and the birthplace of Innocent XI and Clement XIII, the historian Giovio, and Volta, the physician. Pop. (commune), 1881, 25,560; 1901, 38,895; 1911, 43,439.

COMO, LAKE (It. *Lago di Como*, or *il Lario*, Ger. *Comer See*, anc. *Lacus Larius*, praised by Vergil, *Georg.* ii, 159). The most beautiful and celebrated of the Italian lakes, situated in Lombardy, at the western foot of the Bergamese Alps, 30 miles north of Milan (Map: Italy, D 2). Its elevation is 650 feet; its area, about 55½ square miles; its greatest length, 43 miles; its greatest width, not quite 3 miles; and its greatest depth, 1365 feet. The southern part divides, at Bellaggio, into two arms—the eastern called Lake Lecco, the western retaining the name "Lake Como," and having the city of Como (q.v.) at its extremity. Between these two arms lies the fruitful District of Brianza. The river Adda enters the northern end of the lake and leaves at the southeastern extremity, near the town of Lecco. The beauty of Lake Como has long been extolled. The luxuriant landscapes are embellished by costly villas, with gardens, terraces, and vineyards, of wealthy families that have been attracted from many countries by the delightful region and the indulgent climate. The lake is especially the resort of the Milanese aristocracy. A number of the villas, possessing worthy art collections (including particularly several fine examples of Thorwaldsen and Canova), are opened regularly to visitors. The most attractive towns on the lake are Cernobbio, Tremezzo, Cadenabbia, Menaggio, Bellano, and Bellaggio. The steamboat service is excellent. The inhabitants along the shore are chiefly engaged in silk production and manufacturing. Fish are plentiful and of many varieties. The lake partially occupies a fold in the limestone formation of the foothills of the Alps. This depression is traceable in the contours as far as Chiavenna, for Lake Mezzola is really a continuation of Como, though now separated therefrom by the silted delta of the Adda.

COMONFORT, kō'mōn-fôrt', IGNACIO (1812–63). A Mexican statesman. He was a member of Congress in 1842 and a Senator six years later. In 1854, in the uprising against Santa Anna, he aided Álvarez, whose Minister of War he became. Soon after, upon Álvarez's abdication (1855), he became provisional President. He was proclaimed President in 1856, and instituted some important democratic and anticlerical reforms. But he was too generous to his foes and trusted too much in their pledges, and in 1858 was driven into exile. He returned to Mexico in 1861, offered his services to Juárez and the Republic for the approaching struggle between Republicans and Imperialists, and was appointed general, with the command of the fortress of Zaragoza. In 1863 he commanded an army to oppose the French invaders who intended to establish the Emperor Maximilian in power, was defeated by Bazaine near Cholula, and shortly afterward was killed in an ambuscade by bandits.

COM'ORIN. See CAPE COMORIN.

COMORN, kō'mōrn. See KOMORN.

COM'ORO ISLANDS. A group of four large and a number of smaller islands in the Mozambique Channel, midway between Africa and the northern end of Madagascar, lying between lat. 11° and 13° S. and long. 43° and 45° 30′ E. (Map: Africa, J 6). The four larger islands are Great Comoro, Johanna, Mohilla, and Mayotte. They have a total area of 760 square miles. They are of volcanic origin and mountainous; the highest peak, 8500 feet high, on Great Comoro, is still an active volcano. The soil is fertile and produces coffee, cotton, sugar, vanilla, cloves, and coconuts. Cattle are also raised to some extent. The manufactures are coarse cloths, jewelry, and cutlery. The island of Mayotte was ceded to France in 1842, and a protectorate extended over the remaining ones in 1886. The group is ruled by native sultans, who are under the supervision of a French governor residing at Mayotte. The population is estimated at about 65,000, of mixed Arabic, Malagasy, and negro descent, professing Mohammedanism, but practicing fetichism.

COMOX. A coast tribe of Salish Indians in British Columbia. See SALISHIAN STOCK.

COMPAGNI, kôm-pä'nyê, DINO (c.1260–1324). A Florentine historian and statesman of the fourteenth century. Of plebeian origin, he was a member of the silk guild, and in the rise of the populace to power he played an impor-

tant rôle as *consol* of his guild (1282–99), as reformer of the constitution (1282), prior (1289), and *gonfaloniere* (1293). As prior again in 1302, he opposed Pope Boniface and Charles of Valois, but escaped on a technicality the ruin which overtook Dante and the other *Whites* at that time. (See DANTE.) His *Cronaca delle cose occorrenti ne' tempi suoi* was written in 1310–12, probably inspired by the hopes aroused in the *Whites* by the descent into Italy of Henry VII. This narrative deals particularly with the events of 1300, the formation of the Black and White parties, the antecedent history of Florence from 1280, and the subsequent results down to 1312. Frequent errors of fact and the omission of several important episodes which Compagni must have known occasioned (1858–75) a polemic as to the authenticity of the *Chronache*. Compagni's authorship was, however, definitively established by Isidoro del Lungo (*D. C. e la sua cronaca*, Florence, 1879–87), who shows that the Chronicle is not a work of research nor of patient, dispassionate historical interpretation, but is dominated by the feelings of a great personality, which explains its inaccuracies as well as its fiery vigor, its Dantesque objectivity, its healthy emotionality. To Compagni have likewise been attributed, but inconclusively, the *Intelligenzia*, an allegorical poem in *nona rima* and some verses in the manner of the Provençal school.

COMPAGNONNAGE. See GUILD.

COMPAN'ION (Dutch *kompanje*, Fr. *compagnie*, company, crew; influenced in popular etymology by Eng. *companion*, comrade). The skylight or cover to quarter-deck hatches through which the light passes to the deck below. Companions are usually removable. With the disappearance of old-fashioned ships, the name has fallen into disuse. The *companion ladder* is the ladder leading from the quarter-deck to the deck below, and the *companionway* is the hatch (together with its deck house, if there be any) through which the companion ladder leads.

COM'PANY (from Fr. *compagnie*, OF. *companie*, It. *compagnia*, from Lat. *com-*, together + *panis*, bread). A number of persons associated together in a joint enterprise, usually of a mercantile character. A company may be incorporated by public authority, in which case it is known as a corporation aggregate, or it may be unincorporated, when it is called a voluntary association.

Any group of two or more persons acting together under joint direction for a common purpose may constitute a company, but it is only when incorporated that the association as such acquires an independent legal status as an artificial person, capable of suing and of being sued like a natural person. In England the term "company" is generally employed to describe two great classes of associations, viz., (1) joint-stock companies, instituted and organized under the Companies Acts (1862–1900), and (2) public companies, existing by virtue of special acts of Parliament for carrying on certain undertakings of public utility, such as railways, water works, and the like. These are not usually incorporated in England, but are in effect large partnerships trading on a joint stock with transferable shares. Consult *Encyclopedia of the Laws of England*, vol. iii, p. 253 (London, 1907); Lindley, *Companies* (5th ed., London); Buckley, *The Companies Act* (8th ed., London); Healey, *Joint-Stock Companies* (London). In the United States associations of either sort are almost invariably incorporated either by special charter or under general laws. See CORPORATION.

Chartered Companies. As a legal term, "company" was first employed in connection with the great chartered companies of the period of adventure and exploration in England during the fourteenth to the seventeenth century. The essence of these companies was the possession of certain exclusive privileges conferred by royal charter, either a monopoly of trade with certain countries or regions of the earth, or more or less extensive power of colonization and government; or, as was usually the case, a combination of the two. These companies were of two distinct types, viz., the trading company, to which individual merchants were admitted on certain conditions, and then traded each on his own account; and the joint-stock company, in which the trade was carried on in behalf of all its members by the managing board and officers of the company. The latter might be either incorporated (in which case it differed only in the extent of its powers and the character and range of its operations from the modern business corporation), or unincorporated (in which case it was simply a great partnership, of the type known to us as a joint-stock association). In all cases, however, it was usual to vest in the company, or in its officers or managing directors, legal jurisdiction over its members, and, in the case of the colonizing companies, a territorial jurisdiction as well. The famous company, known as the Merchant Adventurers of England, whose beginnings can be traced back to the year 1359, was originally of the type of trading companies, but was incorporated 200 years later by a charter of Elizabeth. The Eastland Company, the Russia (or Muscovy) Company, the Levant (or Turkey) Company, were of the same character. The great colonizing companies under whose auspices the first English settlements in the New World were made—as the Virginia Company, chartered in 1609; the Massachusetts Bay Company, chartered in 1629—were of a composite character, being incorporated for the express purpose of founding new colonies, but organized for trading purposes on the principles of the regular trading companies. The East India Company, on the other hand, chartered in 1600 as a trading company, pure and simple, became a joint-stock company in 1612, and the Hudson's Bay Company, incorporated by royal charter in 1670 (which, shorn of most of its ancient privileges, is still in active existence), is also for trading purposes a joint-stock association.

The extensive powers of government, and even the legal jurisdiction over their own members, formerly vested in these old trading companies, have long since been resumed by the crown. Their present significance lies in the fact that they constitute the beginnings and the foundation of the colonial empire of Great Britain. But the principles on which they were organized and conducted are, with some modifications, still recognized and acted upon in that country. Chartered companies for purposes of trade and colonization in territories not under the sway of Christian powers are still created, and some such companies of recent origin have played an important rôle in the history and politics of the past 20 years. Among these may be mentioned the North Borneo Company, chartered in 1881; the Royal Niger Company, in 1886; the British

East Africa Company, in 1888, and the British South Africa Company, in the same year. All of these companies have had qualified rights of sovereignty and powers of government vested in them, and they have all continued the rôle of the older companies in expanding the limits of the British Empire. See Anderson, *Origin of English Commerce;* Cunningham, *Growth of English Industry and Commerce;* Schanz, *Englische Handelspolitik;* Cawston and Keane, *Early Chartered Companies;* Westlake, *International Law* (London, 1880); Hall, *Treatise on the Foreign Powers Jurisdiction of the British Crown* (Oxford, Eng., 1894); and the comprehensive treatise of Bonassieux, *Les grandes compagnies de commerce* (Paris, 1892); Davis, *Corporations: Their Origin and Development* (New York, 1905); Unwin, *Industrial Organization in the Sixteenth and Seventeenth Centuries* (Oxford, 1904).

City Companies. The incorporated trades or guilds of the city of London. The origin of these companies is to be traced back to the close organization and exclusive membership of the mediæval craft or trade guilds, which appeared in England in the early part of the twelfth century. These had various privileges conferred upon them from time to time by royal charter until in the latter part of the fifteenth century they exercised all the powers of government within the city of London and, indeed, constituted its entire citizenship. Thereafter the "freedom of the city" consisted in membership, as a "liveryman," or "freeman," of one of the city companies, and the franchises of the city were exercised in this fashion until 1725, when the companies were deprived of some portion of their political authority by Act of Parliament. They were further restricted by the reform legislation of 1832 and 1867, but still retain the right of choosing the lord mayor, the sheriffs, chamberlain, and other civic officers. Though the companies have by lapse of time entirely lost their trading character, they still retain their ancient organization, many of their exclusive privileges, and, in some cases, great wealth. There survive 12 great companies and 60 lesser ones. See GUILD; LONDON; and consult Brentano, *Guilds;* Gross, *Gild Merchant;* Norton, *The City of London* (London, 1829); and *Report of the Royal Commission on the Livery Companies* (Parliamentary Papers, 1884); Ditchfield, *The City Companies of London and their Good Work* (London, 1904); Unwin, *The Guilds and Companies of London* (ib., 1908).

Modern Trading Companies. In a legal sense, the term "company" may be applied to any association of individuals for business purposes. This may be a partnership of the ordinary type, a joint-stock association—which is commonly a large partnership formed and conducted in ways prescribed by statute—or a business or trading corporation. It is in the last sense that the term is commonly employed in England. In the United States it has no such definite legal signification. Though there is no inappropriateness in applying it here to any of the three forms of association above enumerated, it usually refers to the second or third form. The expression "company law" may have reference either to the law of business corporations or of unincorporated associations. All of these forms of association for trading purposes are dealt with under their respective heads. See CORPORATION; JOINT-STOCK ASSOCIATION; PARTNERSHIP; VOLUNTARY ASSOCIATION, and the titles and authorities referred to thereunder.

COMPANY. In military organization, an aliquot part of a regiment or battalion, though not absolutely or necessarily so. In the United States all infantry regiments, the three battalions of engineers, and the coast artillery corps, are divided into companies. For duty in the field signal and sanitary troops are also organized as companies. A company of infantry has three officers, a captain, one first and one second lieutenant. Troops of cavalry and batteries of artillery generally correspond in command and organization to companies of infantry. The average war strength of companies in the United States and British armies is 100 men. On the continent of Europe the number varies from 100 to 250 men in Germany and Russia. In the former country the captain of infantry is a mounted officer and has three subaltern officers under his command. The general trend of modern military tactics is to reduce the size of the unit of command in attack formations, largely because of the vast area over which comparatively small bodies of troops are scattered, and the corresponding difficulty of their effective control; thus the importance which heretofore has attached to the regiment or battalion is likely to attach to the company and greatly alter its present formation and organization. See ARMY ORGANIZATION; TACTICS, MILITARY.

COMPANY, JOHN. The popular name for the old East India Company (q.v.).

COMPANY, SHIP'S. All persons who are regularly employed in various capacities on board a ship. In the United States navy it is also frequently used to designate the crew only. See COMPLEMENT; CREW.

COMPARATIVE ANATOMY. For definition, scope, and bibliography, see ANATOMY, and ANATOMY, COMPARATIVE. In this work all the larger topics dealing with the anatomy and physiology of men and animals have been treated comparatively and with reference to their evolution. Such is the character of ALIMENTARY SYSTEM; CIRCULATORY SYSTEM; EAR; EXCRETORY SYSTEM; EYE; FOOT; HAIR; HAND; INTEGUMENT; MUSCULAR SYSTEM; NERVOUS SYSTEM; PELVIS; REPRODUCTIVE SYSTEM; RESPIRATORY SYSTEM; SKELETON; SKULL, and similar articles, in which the reader will find the methods of comparative anatomy exemplified.

COMPARATIVE GRAMMAR. See GRAMMAR.

COMPARATIVE MYTHOLOGY. See MYTH; MYTHOLOGY.

COMPARATIVE PHILOLOGY. See PHILOLOGY.

COMPARATIVE PSYCHOLOGY. See ANIMAL PSYCHOLOGY.

COM'PARA'TOR (Lat., comparer, from *comparare,* to compare, from *com-,* together + *par,* equal). An instrument used in comparing the lengths of two graduated scales or standards of length, and in determining accurately the amount of their difference. It consists essentially of two microscopes, each fitted with cross hairs and capable of being moved by a micrometer screw, or else supplied with a micrometer eyepiece, or often both. (See MICROMETER.) These micrometer microscopes are so mounted that they may be moved both laterally and forward and backward, and through them the observer looks down on the scale which is being examined. The microscopes are then

moved so that their cross hairs are either at the end or over some division of the scale, which often is so magnified that in making a setting it is convenient to bisect the enlarged image of the mark. By means of rollers or other mechanism the platform containing the first scale is temporarily removed and a second introduced in its place. In this case the intersections of the cross hairs are probably some small distance away from the corresponding division of the other scale, and this amount, as determined with the micrometers, is their difference at that temperature. While the operation of comparing two scales does not seem particularly complicated, nevertheless, in order to secure the desired high degree of precision, elaborate precautions are taken both in the construction and manipulation of the apparatus. The temperature at which the scales are compared is of course no unimportant consideration, and in order that this should be uniform and easily determined, they are immersed in a bath of liquid whose temperature can be maintained at some constant point or measured to a high degree of precision. In the comparison of standards there must of course be an ultimate standard to which all measures of length are referred, and this bar is defined as correct at some one stated temperature, usually taken at that of melting ice. Copies of the original standard are made and serve as secondary standards whose coefficient of expansion, minute errors, and other constants are known. Such comparisons are performed by the International Bureau of Weights and Measures at Paris, where comparators, with massive pedestals to carry the micrometer microscopes, and susceptible of the most accurate results and possessing all possible refinements, are employed. (See WEIGHTS AND MEASURES.) Similar but usually less precise apparatus is found also in the various national standards bureaus and physical laboratories. The comparator in the division of weights and measures of the United States Bureau of Standards at Washington consists of a massive beam of invar steel carried on brick piers to which the micrometer microscopes are clamped. The *Mémoires du Bureau International des Poids et Mesures* (Paris) contain full and technical descriptions of the most accurate and approved apparatus and methods. Consult also Fischer, "Recomparison of the United States Prototype Meter," in *Bulletin of the Bureau of Standards*, vol. i, No. 1 (Washington, 1904), and Hallock and Wade, *Evolution of Weights and Measures and the Metric System* (New York, 1906).

COMPARETTI, kōm'pȧ-rĕt'tē, DOMENICO PIETRO ANTONIO (1835–). An Italian philologist, born in Rome. He devoted himself at first to mathematics and the natural sciences. Later, having studied Greek by himself, he became, in 1859, professor of Greek in the University of Pisa. A few years later he accepted a similar position at Florence and afterward went to Rome, where he conducted the lectures on Greek antiquities at the university and studied carefully the excavations in the Forum. Aside from his Greek studies, he is distinguished as a scholar in Romance philology and in the culture history of the Middle Ages. His most important works are: *Saggi dei dialetti greci dell' Italia meridionale* (1866); *Virgilio nel medio evo* (1872; Eng. trans., 1899); *Papiro ercolanese* (1875); *La commissione omerica di Pisistrato e il ciclo epico* (1881); *Iscrizione arcaica del foro Romano* (1900). He wrote also on Pindar, Sappho, and Hyperides, and on the Gortynian law code. (See GORTYNA.) With D'Ancona he edited *Conti e racconti del popolo italiano* (9 vols., 1870–91); with others he edited the *Rivista di filologia e d'istruzione classica*. After 1884 he was editor also of the *Museo italiano di antichità classica*.

COMPAR'ISON (OF. *comparaisun*, Fr. *comparaison*, from Lat. *comparatio*, from *comparare*, to compare). In grammar, and as applied to adjectives (q.v.), that which marks the degree in which the quality is attributed to the object, as compared with other objects. There are three degrees of comparison. The positive indicates the quality generally, without comparison; the comparative, a higher degree of the quality than is attributed to other things; and the superlative, the highest degree that is attributed to any of the things under consideration. Sometimes the positive is not regarded as a degree of comparison. There are two ways of expressing these degrees. 1. By an inflection or change of the word; as, *hard, harder, hardest; happy, happier, happiest.* This mode prevails almost exclusively in Greek and Latin. 2. By an additional word; as, *more happy, most happy.* This may be called logical comparison; the other, grammatical. In French, with the exception of a few irregular adjectives, all adjectives follow the logical method. In English the logical method is generally preferred when the grammatical would produce a word difficult or harsh in the pronunciation. This is generally the case in English when the simple adjective is of more than one syllable, but it is not always so. Thus, *eárnester, prúdenter,* would make harsh combinations; not so *políter, discréeter, háppier.* The difference is, that in *eárnester, prúdenter,* the accent being on the first syllable, two unaccented syllables of discordant character are thrown together; in *políter, discréeter,* the unaccented syllables are separated; and in *háppier,* though they come together, they readily coalesce. Thus, the laws of euphony determine this point, as they do much else in language. Carlyle and Ruskin use many comparative and superlative forms that are not generally recognized. In general, it is only adjectives of quality that admit of comparison; and even adjectives of quality cannot be compared when the quality does not admit of degrees; as, a circular space, a gold ring, a universal wish. Adverbs (q.v.) in English are compared exactly like adjectives, logical comparison predominating.

COM'PASS (OF., Fr. *compas*, compass, from ML. *compassus*, circle, from Lat. *com-*, together, *passus*, step, from *pandere*, to spread out). The mariner's compass is the most important instrument used in the navigation of a ship. Compasses are of two kinds, magnetic and gyroscopic, the latter being a development of the past few years.

THE MAGNETIC COMPASS

The action of the magnetic compass depends upon the attraction of the earth's magnetic force. The earth is a great magnet, with one pole in the neighborhood of 70° N. lat. and 97° W. long., and the other in about 73° S. lat. and 155° E. long. These poles are not points, but merely centres of magnetic areas which are constantly but slowly changing their positions. Over these polar areas a freely suspended mag-

net, balanced about its centre, hangs vertically. As we recede from the magnetic poles, the inclination (or *dip*) of the magnet decreases until, on the magnetic equator (which is nowhere more than 15° from the geographical equator), it is zero. While changing its inclination (q.v.), the magnet continues to point in the general direction of the magnetic pole. This property of a magnet is used in the construction of the mariner's compass, which is merely a magnet or bundle of magnets constrained to move in a horizontal plane about a vertical axis.

When installed on board a vessel, the compass is acted upon by the magnetism of the earth and of the ship. The vertical component of the earth's force produces the *dip*, or *inclination*, of a freely suspended magnet. The ship's force may increase or decrease this, but the ordinary mariner is concerned chiefly with the angle between the compass and the geographical meridian. This angle in naval science is called the *compass error* and is made up of the *variation* (or declination), which is the angle between the geographical and magnetic meridians at the particular locality, and the *deviation*, which is the result of the ship's magnetic force. See INCLINATION; MAGNETIC MERIDIAN.

The *variation*, or *declination* (q.v.), is due to the fact that the lines of magnetic force which affect the needle are exactly parallel to the geographical meridian in only a few places on the earth. The horizontal projection of the line of force at any point of the earth's surface is the direction of the magnetic meridian of that point, i.e., the direction pointed out by the compass needle. The angle between the magnetic and geographical meridians is the variation. The variation is constantly changing from year to year for all parts of the earth, but over some areas the change is, at times, so slow that it is practically *nil*. The increase or decrease continues until a certain maximum or minimum is reached and then reverses its character. In very few parts of the world does it reach 10′ per annum. The variation is also subject to slight monthly (or seasonal), daily, and irregular changes. The monthly change is chiefly shown in an increase or decrease of the daily change. The daily change consists of a movement towards the east for part of the day and a movement towards the west during the remainder. It is greatest near the magnetic poles and least near the magnetic equator. In the temperate regions it rarely exceeds 10′ to 15° range on any one day. Irregular changes of variation of several degrees in amount, may occur during severe magnetic storms in a few minutes of time. See DECLINATION; TERRESTIAL MAGNETISM.

Magnetic charts show the variation (declination), dip (inclination), etc. Curved lines connecting the points of equal variation are called *lines of equal variation*, or *isogonic* lines, the ones connecting points of no variation being called *agonic* lines. The lines of equal *dip* are called *isoclinic* lines, the line of no *dip* being the magnetic equator. The dip of the needle, like the variation, is constantly changing, but the changes are small and do not affect the compass as an instrument of navigation. See ISOGONIC; ISOCLINIC and ISODYNAMIC.

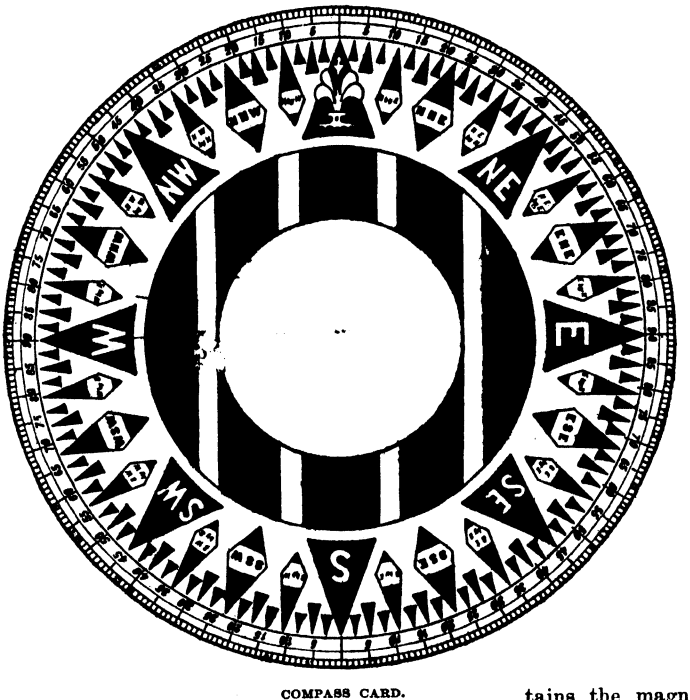
The *deviation* of the compass is produced, as has already been stated, by the action of the magnetism of the ship in which the compass is mounted. In wooden ships the small amount of iron causes correspondingly small deviations. On a nonmagnetic ship, like the specially built vessel, the *Carnegie*, there are no deviations. But iron and steel hulls produce important deviations even in well-placed compasses and excessive deviations in those badly located; it is indeed possible to so place a compass that it will point to a particular part of the ship no matter what her heading be. In mounting compasses due regard must therefore be paid to the magnetic forces of the ship as well as to the convenience of the navigator and helmsman. Standard compasses are usually placed where they are fairly accessible, but as far removed from the ship's centre of magnetic force as possible. A steering compass is necessarily placed where the helmsman can see it constantly. Its deviation is checked by comparison with the standard.

The deviation of a compass varies as the ship changes her course. A portion of the hull is permanently magnetized and acts as a permanent magnet; the rest is in a variable state of magnetization depending upon the direction in which the ship heads and upon the magnetic latitude. As it is important, in order to steer a correct course, that the deviations upon all headings should be known, they are determined by *swinging ship*. This is accomplished by successively pointing the ship in the various directions (usually every 15° to 30°) and comparing the true bearing (ascertained from tables and computation) of the sun with the magnetic bearing. This gives the *error* on each heading. Applying the *variation* to the results gives the corresponding deviations on each point upon which observations were taken. A table of these deviations is a necessary adjunct to every compass. When the deviations are considerable, as is almost invariably the case on a modern ship, it is customary to reduce them by means of correctors. The character and extent of the correction, or *compensation* (as it is commonly called), may be obtained by magnetic observations on board the ship and on shore; from these follow elaborate computations to determine the placing of the correctors. This method involves a competent knowledge of the whole theory of the magnetization of ships; moreover, it involves much labor and consumes much time. A simpler one is called the rectangular method of compensation. The deviation is determined upon adjacent cardinal points such as (magnetic) north and east. The ship is headed on north and kept on that heading by means of another compass and a single magnet, or several small ones, placed in a fore-and-aft direction in holes in a wooden block or on a tray, below the compass to be corrected. By varying the number of magnets, or by raising or lowering the tray by means of a screw, the deviation is reduced to zero and the compass made to point to magnetic north. The same process is repeated when the ship is headed east, but the magnets are placed athwartship. Next the ship is headed northeast (magnetic), and the soft-iron spherical correctors moved in or out until the needle points correctly. The operation is then complete, unless a Flinders bar is used; this consists of a soft-iron vertical bar, used to counteract the induced magnetism in soft vertical iron, and placed forward or abaft the compass as found necessary. The ship must then be swung for *residuals*, i.e., headed in directions 15° to 30° apart, and the small remaining deviations as-

certained. These may be reduced by recorrecting, but are usually too small to render that necessary: but the usual table showing them is made out for use in laying the ship's course. In addition to the deviation caused by the ship's forces when on an even keel, a further deviation is caused by rolling or inclination to one side or the other. This is corrected by a vertical magnet below the axis of the compass and at such a distance as will correct the deviation due to the heel or roll.

The theory of the correction is that the magnets (and soft-iron correctors, which are temporary magnets) are placed in a manner to offer magnetic attraction exactly opposite to that of the forces of the ship, leaving the earth's force alone to act. Unfortunately the combination of the forces of magnets and the ship does not produce magnetic zero, but forms a magnetic field which decreases the effect of the earth's magnetic field; so that when the ship's force is so great as to need powerful correctors at the compass, the latter will be *sluggish*, i.e., have poor directive force.

The magnetic compass as mounted on board ship consists of a framework supporting the needles, the top of which is called the *compass card*. Around its outer edge the degrees are marked. In all except new-type compasses the degrees are marked from 0 to 90 on each side of the north and south points. In recent compasses the degrees are marked from 0 to 360 in the same direction as the hands of a clock move. In addition to the degrees the compass is marked in *points* (11¼°), half points, and quarter points. North, east, south, and west are called the *cardinal* points; northeast, southeast, southwest, and northwest are called the *intercardinal*. Halfway between north and northeast is north-northeast; between northeast and east is east-northeast; and so on. The other points are named north by east, northeast by north, northeast by east, east by north, east by south, etc. A full list of points in proper order is given in the subjoined table. The reciting of the points of the compass in proper order is called *boxing* the compass, and the ability to do so correctly is one of the requirements of a seaman. The present practice in the navy and to some extent in the merchant service is to give all courses and bearings in degrees when accuracy is desired and in points when an approximation only is needed. Thus 135° is exactly southwest; but if a bearing were approximately southwest, then the term "southwest" would be used.



COMPASS CARD.

N.	E.	S.	W.
N. by E.	E. by S.	S. by W.	W. by N.
N. N.E.	E. S.E.	S. S.W.	W. N.W.
N.E. by N.	S.E. by E.	S.W. by S.	N.W. by W.
N.E.	S.E	S.W.	N.W.
N.E. by E.	S.E. by S.	S.W. by W.	N.W. by N.
E. N.E.	S. S.E.	W. S.W.	N. N.W.
E. by N.	S. by E.	W. by S.	N. by W.

One quadrant in quarter points is as follows:

N.	N. N.E.	N.E.	E. N.E.
N. ¼E.	N. N.E. ¼E.	N.E. ¼E.	E. N.E. ¼E.
N. ½E.	N. N.E. ½E.	N.E. ½E.	E. N.E. ½E.
N. ¾E.	N. N.E. ¾E.	N.E. ¾E.	E. N.E. ¾E.
N. by E.	N.E. by N.	N.E. by E.	E. by N.
N. by E. ¼E.	N.E. ¾N.	N.E. by E. ¼E.	E. ¾N.
N. by E. ½E.	N.E. ½N.	N.E. by E. ½E.	E. ½N.
N. by E. ¾E.	N.E. ¼N.	N.E. by E. ¾E.	E. ¼N.
			E.

For the purpose of taking bearings (i.e., ascertaining the compass direction of an object), an *alidade* or *azimuth circle* is used. The former is a simple pair of sight vanes turning about a vertical axis on the binnacle cover over the compass or on the dumb compass on a standard (called a "pelorus") at the ends of the bridge. An azimuth circle is a circular metallic ring fitting over the top of the compass bowl on which it turns freely. On opposite sides it has a sighting vane and reflecting mirrors, so that the point of the compass card immediately beneath it can be seen at the same time that the observer sights at a distant ob-

ject. A *dumb* compass is a simple card or metallic plate, with graduations and marks like those on a regular compass card. It may be permanently secured to a part of the ship or mounted on pivot. See illustration in article BINNACLE.

History. The early history of the magnetic compass is involved in more or less obscurity. In a rough form it is said to have been known to the Chinese 2000 years before the Christian era, though this is more than doubtful. But the policy of the Chinese rulers and the habits of the people conspired to make the Chinese indifferent and unenterprising navigators, so that even if a knowledge of the directive property of a magnet were known to them it is not likely that they made much use of it. The earliest definite reference to it is in a work by Alexander Neckam, entitled *De Utensilibus* and written in the twelfth century. He refers to it as a needle on a pivot which, when allowed to come to rest, shows the navigator the direction in which to steer. In another work, *De Naturis Rerum* (lib. ii, c. 89), he writes as follows: "Mariners at sea, when, through cloudy weather in the day, which hides the sun, or through the darkness of the night, they lose the knowledge of the quarter of the world to which they are sailing, touch a needle with a magnet, which will turn round till, on its motion ceasing, its point will be directed toward the north" (Chappell, *Nature*, No. 346, June 15, 1876). Subsequent to this there are repeated references to the use of a magnetic needle for navigating purposes. As early as the thirteenth century it seems to have been known to the navigators of all European nations. In 1248 Hugo de Bercy speaks of an improved form in which it is supported on two floats in a glass cup, while as early as 1269 its variation from true north is said to have been noted. The division of the compass card into 32 points is a natural one and was in use in 1391, when it is mentioned by Chaucer.

THE GYRO COMPASS

Until quite recently all navigating compasses were of the magnetic type, and in the mercantile marine these are still used almost exclusively. But in naval vessels, particularly in heavily armored ships and submarines, the strong magnetic forces in surrounding structures prevent the placing of magnetic compasses in the most desirable positions, especially as many of these structures (such as turrets, guns, observation towers) are being frequently moved so that the strength and direction of their magnetic forces are changed in a manner to preclude compensation or correction. Other means have therefore been sought for directing the course of war ships, the most promising of which seemed to be the gyro compass, but it was not until about 1910 that this instrument became sufficiently developed as to reliability and convenience. It is installed on all battle ships and submarines in the United States navy, and, while not yet perfectly satisfactory, it is of the greatest utility and is being steadily improved. The principal troubles have been due to lack of sturdiness of construction, and this will be corrected. If, in addition, the master gyro mechanism be installed in duplicate or triplicate, all compass difficulties will probably be solved and the magnetic compass, except as a possible reserve, dispensed with as far as large naval vessels are concerned.

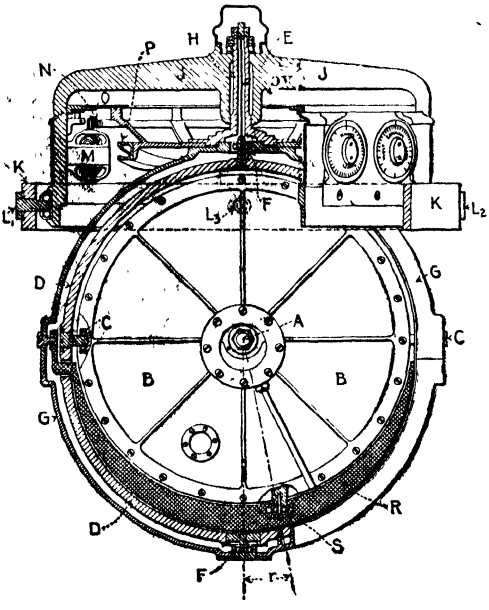
The construction of the gyro compass is founded upon the fundamental phenomena of rotation, inertia, and precession. The underlying principles may be stated in three laws as follows:

1. A spinning mass may be moved in any direction without the slightest resistance, response, or reaction, so long as the path of movement is a straight line; but if the path be other than straight, new phenomena at once manifest themselves in the form of automatic motion, provided the mass is free to move in directions other than that of its spin.

2. When a spinning mass receives a force which tends to change its plane of rotation, it not only resists such force, but the mass will manifest motion at a different angle from the impressed force and seemingly unrelated to it. This motion is known as precession, and its explanation follows directly the application of Newton's first law.

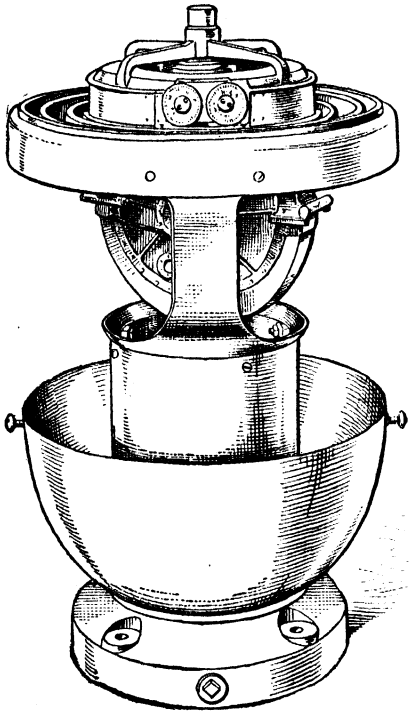
3. Any revolving mass, such as a spinning wheel, tends to swing so as to bring its axis of rotation parallel to the axis of any externally applied force tending to make it move in a closed regular curve (such as a circle) and in such relation that the direction of rotation is the same as the direction of the applied force. From this we see that the axis of a freely suspended gyro wheel will tend to turn parallel to the earth's axis of rotation, so that its spin will be in the same direction as that of the earth.

In the United States the best-known gyroscopic compass is made by the Sperry Gyroscope Company of New York. The accompanying illustrations show the parts of this compass.

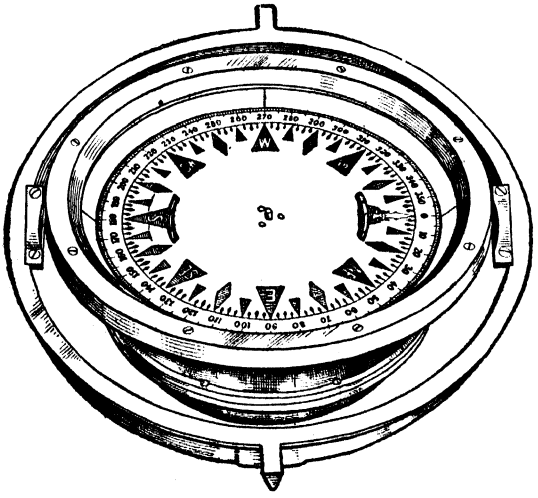


Inside the casing *B* (above) the gyroscope wheel rotates on a horizontal shaft. The casing is pivoted on a horizontal axis *C* through its centre of gravity and is carried by the frame *D*. This frame is suspended from the upper end of the vertical extension of the "phantom"

ring *G* by means of the torsionless wire *E*. By means of the bearings L_1, L_2, L_3, and L_4, and the ring *K* the frame *J* is mounted in Cardan suspension. The ring *D*, together with the wheel



casing, is called the *element*. On the ring *D* are electrical roller contacts which form connection with corresponding contacts, the latter being on the phantom. These connections control the follow-up motor *M*, which is carried on the frame *J* and which by means of the



gearing *N* moves the phantom in azimuth to correspond to any movement of *D*.

The phantom carries the compass card *O*, and on it is the cam *P*, a part of the automatic correction device, which mechanically solves the corrections necessary to be applied to the compass to allow for the course of the ship, the speed on that course, and the latitude. The bail *R* is supported by the phantom ring. It is attached to the gyro casing at *S* and is connected in such a position that it is eccentric to both the vertical and horizontal axes of the gyro. By this means oscillations of the gyro are lessened or prevented. This also produces positive orientation.

The gyro wheel revolves in a vacuum inside the casing at approximately 8500 revolutions per minute. This speed is obtained by means of an alternating current motor without commutator. At this speed the compass has a directive power of approximately 200,000 *dyne cms.*

The readings of this master compass, which is situated in the most convenient and best-protected part of the ship below decks, are transmitted to repeating compasses by means of a transmitter, which is operated by the master and forms part of its mechanism. The repeating compasses are placed wherever desired—in the conning tower, on the steering platform, bridges, etc. The transmitter controls the poles of a small motor in each repeater compass in such a manner that the armature of this motor is turned by steps to follow the dial of the master compass when it moves. In order to obtain the same reading on the repeaters as on the master, a synchronizer forms part of the installation, and by means of it all the repeaters may be set to the same reading as the master.

Messrs. Martienssen and Anschütz-Kaempfe have invented a gyroscope compass which is floated in mercury. As this compass has but two degrees of freedom and is consequently affected beyond this by the heeling or pitching of the ship, it is said to give results not so satisfactory as those of the Sperry type. Other types of gyro compasses are in use or undergoing experimental investigation.

Bibliography. Consult: *The Admiralty Manual for the Deviations of the Compass*, by Capt. F. J. Evans, R.N., F.R.S., and Archibald Smith, M.A., F.R.S. (new editions appear from time to time); *Naval Professional Papers* (U. S. Navy), No. 22 (Washington, 1886); Cornwell, *Compass Disturbances in Iron Ships* (1887); Bowditch, *The American Practical Navigator* (Washington—new editions at short intervals); Lyons, *Treatise on Electromagnetic Phenomena and the Compass and its Deviations Aboard Ship* (New York, 1901–03); Smith, *Practical Compass Adjustment* (Seattle, 1903); Diehl, *Deviations of the Compass, Practical Problems* (Washington, 1902); publications of the Superintendent of Compasses, United States Navy. For gyro compasses, see article on "Engineering Applications of the Gyroscope," in *Journal of the Franklin Institute* (May, 1913).

COMPASS, SOLAR. An instrument for determining at any place an accurate north and south line. It has a latitude range of about 35° and may be adjusted to the latitude of any place in the United States. It has a latitude arc, a declination arc, and an hour arc, each to be duly adjusted for an observation, and has been found of much service in running important boundary lines and other government surveys. One of its recommendations is its avoidance of the perplexities caused by local attraction. It is the invention of William A.

Burt, of Michigan. For illustration, see Plate of ENGINEERING INSTRUMENTS.

COMPASSES. A mathematical instrument for transferring or marking off distances (and for this purpose often called "dividers") or for drawing circles. The common compasses, or dividers, are composed of two rods or legs joined together by a pivot joint at one end and pointed at the other; when adapted to drawing arcs, the lower part of one of the legs admits of receiving a pen or pencil.

Beam compasses consist of points sliding on a bar, to which they may be clamped at any distance from each other. They are used for lengths greater than the pivot compasses can expand, and when delicately made can be used for more accurate dividing. See GRADUATION.

Proportional compasses have a point at each end of each leg, and the pivot between, thus forming a double pair of compasses opposite to each other. If the pivot is midway between the ends, the opening of each pair of points will be equal. If its distance from one pair of points be double that from the other, the openings will be as two is to one, and so on for any ratio. To adapt them for variable proportions, the pivot is made a clamping screw, which moves in an elongated slot in the legs and may be fixed at any point.

Triangular compasses have three legs, so that the vertices of a triangle may all be transferred at once.

Bullet or *club compasses* have a ball in place of one point, adapted to turning in a hole. See also CALIPERS; ELLIPSE (ellipsograph, or oval compasses).

COMPASS PLANT (*Silphium laciniatum*). A large plant, called also "resin weed," because it abounds in resinous matter. It grows on the prairies, and the edges of its stem leaves are said always to point directly, or nearly, north or south. When cultivated in gardens or growing in shade, this property does not always appear. The same phenomenon is exhibited by the stem leaves of prickly lettuce (*Lactuca scariola*). In this plant the leaves are usually considered as vertical, but this is brought about by a twist near their bases. The peculiar arrangement of the leaves of these plants is due to their adaptation to light. Both surfaces of the leaves are equally sensitive to light, and only by presenting their edges vertically and their tips to the north and south are they able to secure equal illumination to both sides of the leaves.

COMPENSATION. In English and American law, pecuniary reparation for loss sustained or for injuries suffered. The usual measure of damages in actions at law, whether based on tort, or wrong, or on breach of contract. (See DAMAGES.) In the civil-law systems of the continents and of Latin America, and in Scots law, a counterclaim or set-off. The principle applied is that, where two parties are mutually indebted, their debts shall extinguish each other if equal, and, if unequal, leave only a balance due. In order to avail one's self of the principle of compensation, the set-off or counterclaim must be pleaded, as it does not operate ipso jure; but, when pleaded, it is held to operate from the period when mutual claims existed, the interest on either side being stopped from that time.

Compensatio injuriarum is a defense against actions of damages for slander or the like. It is not a bar to an action, but a set-off or counterclaim. In the common-law system of England and the United States it is not permissible to set off one trespass or other wrong against another, but each injury must be compensated by a separate action; and in Scotland the leaning recently has been in the same direction. See CONTRACT; TORT; and consult the authorities there referred to.

COM'PENSA'TION (Lat. *compensatio*, equalization, from *compensare*, to equalize, from *com-*, together + *pensare*, to weigh, frequentative of *pendere*, to weigh). A term used in physical experiments to describe methods where sources of error or other conditions are neutralized by the introduction of factors which act in an opposite direction by an equal amount, and compensate for the original error. For example, a flint-glass convex lens, in addition to refracting rays of light, also separates them into their spectral colors. This can be compensated by combining with the convex lens a concave lens of crown glass which has less refraction but greater dispersive power. Such a lens, being opposite in its effect to the first lens, will unite the rays, but does not destroy the deviation. (See ACHROMATISM.) In the case of the pendulum (q.v.), an increase in temperature causes it to lengthen, and consequently oscillate more slowly. Compensation is here effected by raising its centre of oscillation with any increase in length due to a rise in temperature and thus keeping constant the distance between its point of support and its centre of oscillation. In a chronometer the balance wheel is compensated by constructing its rim of two metals with different coefficients of expansion. An increase in temperature tending to expand the wheel is compensated by the rim being brought nearer the centre, it being curved inward by the uneven expansion of the metals. See WATCH, for further description and illustration of a compensating balance wheel.

COM'PETENCE, or COM'PETENCY. As a law term, used in the sense both of authority and of legal ability. It is in the former sense that it is employed in the law of France and of other Latin countries as the equivalent of our term "jurisdiction," the competence of a tribunal being its authority or jurisdiction over a given person or proceeding.

In English and American law the word is specifically used to denote the legal fitness or eligibility of a witness to be heard, or of a judge or juror to participate in the trial of a cause. Competency, in the legal sense of the term, does not refer to mental or physical ability, but to purely legal grounds of qualification —as that a judge or juror shall not be personally interested in the issue to be tried; that a witness shall not be so related to the transaction on which the suit is based as to be incapacitated by law from giving evidence thereof. Such facts as the credibility of a witness, the relevancy of his testimony, or even his actual knowledge of the transaction in question, have no bearing upon the question of his competency. He may be competent to participate as a witness and may yet be utterly untrustworthy or ignorant of the facts involved in the issue. So, not having been an actual, percipient witness of the facts to which he is called upon to testify, he may have his testimony excluded as mere hearsay, without thereby having his

legal competency questioned. In that case it is not the witness, but the evidence offered by him, that is "incompetent." Competency, whether of judge or juror or witness, is always presumed until it is impeached and the contrary shown. The question is one for the court, which may inquire into the facts for the purpose of arriving at a judgment upon it. The law as to the competency of witnesses will be considered under the title WITNESS. See also EVIDENCE: JUDGE; JURY; and the authorities there referred to.

COM'PETI'TION. In the broadest sense of the term, rivalry for a common object, such as the means of livelihood, a position of supremacy, a unique honor. Competition in this sense is coextensive with life; most of the acts grouped under the rubric "the struggle for existence" are competitive. Competition may arise between groups or between individuals. Group competition may be illustrated by the struggle between evergreen and deciduous trees for the soil of certain mountain slopes, between cattle and sheep for grazing grounds, between states or nations for territory or power. Of the last, familiar examples are the competition of Dutch and Portuguese for the control of the Indies, of the French and English for the control of the Mississippi valley, of Athens and Sparta for Hellenic hegemony. The Kansas-Nebraska struggle was a competition between the supporters of slavery and its enemies. Racial competition is manifest in the conflict between Germans and Poles for the possession of the land in certain Polish provinces.

The term "competition" is often employed, by way of analogy, to describe mere rivalries of technique. Thus there is said to be competition between the Bessemer and the open-hearth methods of steel manufacture, between electricity and steam as motive power, between the telegraph and the long-distance telephone. Often such competition is underlain by competition between individuals or groups, but this is not necessarily the case.

In political economy "competition" is confined to rivalry in supplying an economic demand, or the acquisition of an economic good or service. It is thus twofold, seller's competition and buyer's competition. The former exists when more than one seller offer the same commodity, or commodities meeting the same need. Thus competition exists, not only between those who offer beef for sale, but also between the latter and those who offer any satisfactory substitute for beef. Competition is, however, limited in its effectiveness where the products offered by rivals are not practically identical technically.

Competition in the economic sense of the term is especially characteristic of the modern epoch. While competition between merchants engaged in foreign trade antedates written history, the competition between retail dealers and between producers was closely regulated, by custom or mutual agreements, or occasionally by law, until a comparatively recent period. With the expansion of trade after the great discoveries in the fifteenth and sixteenth centuries, the structure of customary and regulated prices in western Europe began gradually to disintegrate. The process of disintegration was hastened by the formation of national states and the loss of control by the cities over local prices. The wages of labor were slow to respond to the influence of competition until the application of capital to industry broke down the earlier handicraft system. From the Industrial Revolution (q.v.) the progress of competition has been rapid. In the field of wholesale prices its sway is complete, and the same thing is true of prices of capital shares dealt in on the exchanges. In retail trade competition is subject to a greater or less limitation through custom, the ignorance or indifference of the buyer, or through agreements among dealers. In the supplying of agricultural products competition operates practically without restraint; and the same thing is true of a great variety of manufactures. In other parts of the manufacturing field competition is regulated by agreements between producers, or in some cases by a unification of a majority of the industry under a common control. Ocean transportation is essentially competitive; land transportation is largely subject to regulation by private agreement or by public authority. In the capital market competition is the prevalent regulator. In the labor market competition is subject to restraint, universally through the half-conscious solidarity of labor, and in part of the field, through labor organizations or through public regulations. Furthermore, there are a number of fields in which the earlier ideals of fair price act to restrain competition. Thus physicians' fees are rarely determined by direct competition, but rest partly upon mutual agreement, partly upon custom, and partly upon a sense of inherent justice. Such vestigial instances of an earlier economic order are, however, of minor importance, as compared with the conscious restrictions upon competition imposed by trades unions, combinations of employers, and state action.

Even where competition is restrained, its influence is powerful. The trade-union cannot often raise wages much above the level prevailing in industries where competition is active in determining the wages contract. The most powerful capitalistic organizations are limited in their price policy by the possibility that new competitors will spring up. Such possible competition, known in political economy as "potential competition," often escapes popular notice; it is none the less perhaps the most powerful regulator of the prices fixed by trusts and other semimonopolistic enterprises. Where the price of a commodity or a service is stereotyped by custom, as in the case cited above of physician's fees, competition takes the form of a multiplication of those providing the service, and hence regulates average incomes, if not prices. When the income is fixed by law, as in many public services, competition determines the personal quality of the candidates chosen. When railways operate under agreements as to fares, competition appears in the quality of service provided.

In view of the development of monopolistic combinations in recent decades, it is often asserted that the era of competition is already past. This opinion is not commonly shared by the economic historian, who finds far less competition in earlier periods than is popularly believed to have been prevalent, and who finds in the present institutions competition everywhere, often disguised under its various protean forms. From the view point of economic history, the present economic system is un-

doubtedly best described as one of competition, tempered everywhere by elements of monopoly.

In pure economic theory the concept of competition is employed as a premise in the construction of logical systems of economics. There is no attempt to demonstrate the existence of unrestrained competition; in fact, such an attempt would be foreign to the spirit of pure economics. What is sought is a convenient clue to the baffling problems of price and the distribution of income; and this clue has commonly been found in competition. Assuming perfect competition, what prices and incomes would continue to exist? The results of such an analysis are unreal, but they throw light upon the tendencies of an economic system in which competition is widely prevalent, as the present. By successive approximations, allowing for friction and monopoly, the theoretical structure is made to conform more nearly to reality. Among superficial critics of economics the view is current that this employment of competition as a logical premise is tantamount to the erection of competition into an ideal, a proper object of economic policy. As a matter of fact, there is no unanimity among economists who employ this method as to the social utility of competition.

Competition was indeed regarded as an ideal by the early economists, both French and British. The hampering effects of public regulation of industry in the eighteenth century produced a powerful reaction in the minds of such profound students as Quesnay, Turgot, and Adam Smith. These writers would have supported the practical elimination of all state interference in industry as well as the suppression of all combinations to restrain free competition. The argument for such extension of the sway of competition was a plausible one. If subject to no restraint, each capitalist would place his capital where it would yield the highest returns, each laborer would seek the point where he would receive the highest wages. The highest profits and the highest wages, however, could be paid only by such industries and under such methods as would yield the largest amount of valuable products. Thus the free play of self-interest, under competition, would yield a maximum of production in society. The more capable producers would underbid the less capable in the sale of goods, and hence the productive powers of society would be concentrated in the most efficient hands. Under active competition prices could not rise above costs to the most numerous class of producers; exceptional rewards could be gained only by those who succeeded in introducing new methods; and sooner or later these methods would become general, fixing a new and lower level of costs. Among workingmen, if competition leveled down the wages of the privileged minority, it would level up the wages of the unprivileged majority; and all workers would share in the benefits of the abundance and cheapness of commodities produced by an efficient system.

In a century of experience with the competitive system it has become clear that while much of the good that the system was expected to develop has actually been realized, many evils also have arisen out of it. The supplanting of inferior methods by superior ones has been accompanied by untold hardship to the laborers employed under the former methods. Again, in the matter of the labor contract, competition has often been only one-sided, laborers competing for jobs, with no effective competition of employers for men. Under such a system the interests of labor have naturally suffered. In many cases competition has not expelled the inferior employer from the field, but has forced him to cut wages and drive his working force all the more ruthlessly. In the market for commodities competition has often had the effect of stimulating the progress of adulteration rather than that of improvement. Perhaps the heaviest indictment against the system of free competition has been the development of cutthroat methods; such, e.g., as underselling an efficient but poor competitor until he is driven from the field, and then recovering the cost of the competitive struggle through monopoly prices. Competition of this character, it is generally recognized, leads inevitably to monopoly and should be restrained in the interest of the competitive system itself. There are, further, certain businesses, such as railway transportation, in which competition produces endless discriminations among patrons. Those who are so powerful that their business is worth striving for, and those who have established themselves at strategic points where several routes compete, are favored at the expense of those who are poorer or less favorably situated. Railway competition, it is widely believed, is more injurious to society than railway monopoly.

Competition, finally, entails heavy burdens upon society through the excessive duplication of plant, the distribution among many of the services that could be performed by one, through advertising calculated, not to create a demand for a commodity, but to attract customers away from competitors who would otherwise supply them.

In view of the recognized defects of the competitive system it is not surprising that few economists hold to the doctrine of the sufficiency of competition as a regulator of economic life. In many instances competition itself needs to be regulated, either by mutual agreement or by law; in other instances, especially in matters pertaining to the wages contract, the force of competition needs to be supplemented by positive social regulations. In a part of the economic field—the natural monopolies—it would be desirable to abolish competition altogether.

Literature. The subject of competition is treated, more or less incidentally, in almost all authoritative treatises on political economy (q.v., for bibliography). There is no important work treating of competition in all its aspects. For the inadequacy of competition as a regulator of wages, consult Webb, *Industrial Democracy*, part iii (new ed., London, 1902). For the illegitimate forms of competition now prevalent, consult Eddy, *The New Competition* (New York, 1912). See MONOPOLY; TRUSTS; RAILWAYS; TRADE-UNIONS; POLITICAL ECONOMY.

COMPIÈGNE, kôN'pyâ'ny' (Lat. *Compendium*). A town in the Department of Oise, France, on the river Oise, a little below its junction with the Aisne, and 33 miles east-southeast of Beauvais (Map: France, N., H 3). The town is picturesque and has a remarkable Gothic hôtel de ville, with museum and library, and a magnificent palace built by Louis XV.

It contains a library, a picture gallery, and a museum of Cambodean antiquities. The park is extensive, and adjoining the gardens is the beautiful forest of Compiègne, extending over about 30,000 acres, which in the past has served as a royal hunting ground. The industries of the place are rope making, boat building, manufacture of hosiery, sweetmeats, pipe, chemicals, and hats. There is considerable trade in wool, grain, and cattle. Pop. (commune), 1901, 16,503; 1911, 17,046. Compiègne is mentioned in the times of Clovis under the name of *Compendium*. It was at the siege of this town, in 1430, that Jeanne d'Arc, the Maid of Orléans, was captured; Louis XIII signed treaties with Sweden and Holland here in the seventeenth century; in 1810 Napoleon and Maria Louisa of Austria first met here, on the occasion of their marriage. See De Bicquilley, *Quelques recherches historiques sur les origines de Compiègne* (1875).

COM'PITA'LIA, or LUDI COMPITALICII (Lat., Compitalian games, from *compita*, crossroads). An annual festival in Rome, held between December 17 and January 5, in honor of the *Lares Compitales*, the divinities presiding over places where two or more roads meet, in country or in city. Even slaves had a part in the festival, which seems later to have included public games. Macrobius has a strange story, that Tarquinius Superbus restored the festival, which had been neglected, and sacrificed boys as a part of the services. Human sacrifices, he continued, did not survive the Tarquins, for after their expulsion garlic and poppies were offered. Consult Fowler, *Roman Festivals of the Period of the Republic* (London, 1899), and Wissowa, *Religion und Kultus der Romer* (2d ed., Munich, 1912).

COMPLAINT. At the common law, a formal accusation of a crime preferred before a magistrate or other public authority charged with the duty of making inquiry into its commission. The charge must be specific, and the complaint must state the facts constituting the crime as well as those upon which the complainant relies to establish its commission. The term is also employed in England to denote the accusation laid before a justice of the peace or courts exercising a summary jurisdiction in cases where proceedings are commenced on information and not by indictment.

In the system of code pleading, which has in many of the United States superseded the system of common-law pleading, the first pleading in a civil action, corresponding to the declaration at common law and to the bill in equity, is known as the "complaint." It is thus defined by the New York Code of Civil Procedure (sec. 481): "A plain and concise statement of the facts constituting each cause of action without unnecessary repetition." See INFORMATION; DECLARATION; BILL; PLEADING.

COMPLAINT', THE. A collection of poems in blank verse, by Edward Young (1742), better known under their secondary title, *Night Thoughts*. They were written after the death of his stepdaughter and her husband, who are referred to under the names of Narcissa and Philander.

COMPLAINT OF MARS AND VENUS, THE. A poem by Chaucer, written about 1380, containing an introduction and two separate poems, "The Complaint of Mars" and "The Complaint of Venus." At the conclusion the author says it was taken from the French of "Graunson."

COMPLAINT OF PITY, THE. "How Pitie is dead and buried in a gentle Herte," a poem by Chaucer (1367).

COMPLEAT ANGLER, THE. A famous work on angling, by Isaak Walton (1653). It is written in a pleasing style; parts being in the form of conversations between Piscator, Venator, and Viator—a fisherman, a huntsman, and a pedestrian—interspersed with a few quaint old songs. See ANGLING.

COMPLEMENT (Lat. *complementum*, that which fills up, from *complere*, to fill up, from *com-*, together + *plere*, to fill; connected with Gk. *πιμπλάναι, pimplanai*, Skt. *pūr, par*, to fill, Lith. *pilnas*, OChurch Slav. *plŭnŭ*, OIr. *lōn*, full, Goth. *fulls*, OHG. *fol, foll*, Ger. *voll*, AS., Eng. *full*). In mathematics, that which completes a given magnitude or increases it to the value of a fixed magnitude. In angular measure it signifies the angle which, added to a given angle, produces 90°; e.g., 30° is the complement of 60°, 1° is the complement of 89°, 45° is the complement of 45°, 100° is the complement of −10°, and 0° is the complement of 90°. Such pairs are called complementary angles. The arithmetic complement of an integer is the difference between the integer and the next higher power of 10; e.g., 40 is the arithmetic complement of 60, 1 is the arithmetic complement of 99, 375 of 625, and 7 of 3. The complement logarithm, or "cologarithm," of a number, is the logarithm of the reciprocal of the number, or 10 less than the complement of the logarithm (of the given number). See LOGARITHM.

If through any point on the diagonal of a parallelogram lines are drawn parallel to the sides, four parallelograms are formed. The two of these that are not bisected by the given diagonal are called complements of the given parallelogram.

COM'PLEMENT. In nautical language, all persons designed to be on board a ship for the purposes of navigating or fighting her, or to enable her to carry on the service for which she is intended. The complement includes the officers and crew; but the latter terms apply to the persons actually on board, while the former applies to all who *should* be on board if there are no vacancies.

COM'PLEMEN'TARY COLORS. Colors which, when combined, produce white light. Examples of pairs of such colors are given in the following table:

Red	Green-blue
Orange	Cyan blue
Yellow	Ultramarine-blue
Greenish yellow	Violet
Green	Purple

These colors may be observed readily with a simple polariscope, where polarized light from a Nicol's prism (q.v.) falls upon a prism of calc-spar and glass, in which, by virtue of the doubly refracting power of the calc-spar (see LIGHT, *Double Refraction*), there is furnished a double image of the aperture through which the polarized light from the Nicol passes. If a strip of selenite be interposed between the polarizing prism and the crystal, the two images referred to will be different in color, one shade being complementary to the other. These strips of selenite may be of various thicknesses and

will thus produce various colors. This follows from the well-known principle that, when plane-polarized light is transmitted through a thin plate of a doubly refracting medium, the ordinary and extraordinary rays when examined with a doubly refracting analyzer will give images brightly colored, which where they overlap are white, showing that the two colors are complementary. If two complementary colors are combined—and it must be remembered that the colors themselves, not the pigments, are here meant—then white light is produced. This can be accomplished best, perhaps, with the Maxwell color disk where a disk of cardboard composed of segments of complementary colors is rapidly rotated. The impressions of the two colors follow each other so rapidly that the sensations are blended, and if the colors are used in the right proportions we have a gray tint produced, as the luminosity of the two colors either singly or jointly is not so great as that of a white surface with which it would be compared. Complementary colors vary with the light by which they are viewed and are different when seen by artificial illumination from what they are in the daytime. The explanation is to be found in Young's theory where the color sensation is considered to be furnished by three groups of nerves corresponding to the red, green, and violet-blue waves. If all of these nerves are stimulated together, the sensation produced is that of white light. Consequently a certain red acts on the red nerves, while its corresponding complementary color, green blue, would stimulate the other sets of nerves, and the result of all acting together would be the sensation of white light. For a thorough discussion of this subject, which may be appreciated by the general reader as well as the student of physics, consult Rood, *Modern Chromatics*, a new edition of which was published (New York, 1899) under the title of *A Text-Book of Color*. See COLOR and the authorities there cited; VISUAL SENSATION.

COMPLEX'ION (OF., Fr. *complexio*, from Lat. *complexio*, combination, from *complecti*, to entwine, from *com-*, together + *plectere*, to weave). The color of the skin, existing in the epidermis and dependent upon certain pigment cells. Those persons most exposed to the weather and least under the influence of civilization are usually of the darkest color. Light hair is the usual accompaniment of white and thin skin, while dark hair and dark complexions commonly go together. There does not appear to be any anatomical difference in the skins of persons of light and dark complexions; the differences are the result of temperature, climate, and exposure. The more decided differences in skin color which may be called racial—the white of the Caucasian, the brown or olive of the Mongolian, the yellow or tawny of the Malayan, the red of the Amerind, and the black of the African and Australian—are apparently connected with deep-seated physiologic processes as well as hereditary causes; they are discussed elsewhere. See SOMATOLOGY.

COMPLEX NUMBER. The steps in the growth of the number system of algebra may easily be illustrated by the roots of equations, thus:

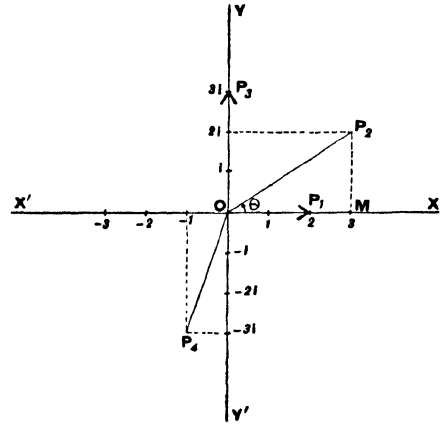
The solution of the equation $x - 3 = 0$ is 3, a positive integer which may be represented graphically on a straight line. The solution of the equation $3x - 2 = 0$ is ⅔, a fraction which may also be represented graphically on a straight line. The solution of $x^2 - 2 = 0$ is $\sqrt{2}$, a surd which may be represented by the diagonal of a square whose side is 1. The solution of $x + 2 = 0$ is -2, a negative number, which may be represented on a straight line in the opposite direction from that of the positive number. But the solution of

$$x^2 + 2 = 0 \text{ is } \pm\sqrt{-2} \text{ or } \pm\sqrt{2} \cdot \sqrt{-1},$$

called an "imaginary number." The symbol $\sqrt{-1}$ is commonly called the "imaginary unit" and is represented by i. All numbers containing the factor i are called "imaginary numbers," as opposed to real numbers; e.g.,

$$\pm i, \pm 2i, \pm 3i, \ldots \pm \tfrac{3}{4}i, \pm\sqrt{2}.i$$

are imaginaries. The algebraic sum of a real number and an imaginary is called a complex number; e.g., $1 + i$, $2 - 4i$, and in general $a + bi$. A complex variable is generally expressed by $x + yi$, in which x and y are real



variables. Complex numbers are represented graphically in a plane. In the figure the real numbers are laid off on the axis XX' in the usual way, and the coefficients of i on the axis YY'. The points in the plane corresponding to these coördinates represent the complex numbers. Thus, P_1 on the axis represents the real number 2, P_2 represents the complex number $3 + 2i$, P_3 represents $3i$, and P_4 represents $-1 - 3i$. Any point and the origin uniquely determine a line segment, or vector, called the modulus of the complex number, and this may also be taken to represent the number. In the figure the moduli are OP_1, OP_2, OP_3, OP_4. In general, the modulus of a complex number $a + bi$ is the diagonal of a rectangle of sides a and b; hence its absolute value is $\sqrt{a^2 + b^2}$. Thus, the modulus of $3 + 2i$ (OP_2 in the figure) is $\sqrt{9 + 4}$ or $\sqrt{13}$. The convention as to the direction of i is a reasonable one; for since multiplying $+1$ by -1 revolves it through 180° to the position -1, therefore its multiplication by one of the two equal factors of -1, viz., $\sqrt{-1}$, may be interpreted as revolving it through 90°. There are other sufficient reasons for this convention, which will be evident to one who studies the subject. The complex number is a directed magnitude; i.e., it has both extension and direction in its plane. This is best understood by considering the number $a + bi$ in

the form $r(\cos\theta + i\sin\theta)$, in which r is the modulus $\sqrt{a^2+b^2}$, and θ is the amplitude. In the figure $\cos\theta = \frac{a}{\sqrt{a^2+b^2}}$, $\sin\theta = \frac{b}{\sqrt{a^2+b^2}}$ (See TRIGONOMETRY.) This method of representing the complex number as a directed magnitude in a plane was at one time thought to be due to Argand, and hence the figure is often called "Argand's diagram." Two complex numbers which differ only in the sign of the imaginary part are called conjugates; e.g., $2 + 3i$ and $2 - 3i$, or, in general, $a + bi$ and $a - bi$. Complex numbers are subject to the associative, commutative, and distributive laws, and, when combined by the fundamental operations of algebra, yield no number not already defined in this article. For $x + yi$ represents real numbers when $y = 0$, imaginaries when $x = 0$, and complex numbers when x, y are real and not zero. Hence $x + yi$ becomes a convenient form for representing general numbers; and instead of saying that every equation has a root, which may be real, imaginary, or complex, we may say that every equation has a root $x + yi$. If, in plotting the successive moduli of a sum, the second modulus is drawn from the end of the first, the third from the end of the second, and so on, the result is a broken line which may be closed by connecting the last point with the origin. This vector is called the sum. Since no side of a polygon is greater than the sum of the remaining sides, the modulus of the sum of any number of complex numbers is not greater than the sum of their moduli. This is expressed symbolically thus:

$$|N_n| \leqq |N_1| + |N_2| + \ldots + |N_{n-1}|$$

Multiplying the expression $r(\cos\theta + i\sin\theta)$ by $r'(\cos\theta' + i\sin\theta')$ and applying the formulas for the functions of the sum of two angles (see TRIGONOMETRY), the product is $rr'[\cos(\theta + \theta') + i\sin(\theta + \theta')]$. Hence the product of the moduli of two complex numbers is the modulus of their product, and the sum of the amplitudes is the amplitude of the product. Similarly for n complex numbers. For brevity, let $r\mathrm{cis}\theta \equiv r(\cos\theta + i\sin\theta)$, then $r_1\,\mathrm{cis}\theta_1 \cdot r_2\mathrm{cis}\theta_2 \cdot \ldots r_n\mathrm{cis}\theta_n = r_1 \cdot r_2 \ldots r_n\mathrm{cis}(\theta_1+\theta_2+\ldots\theta_n)$. This is known as De Moivre's theorem. If each of the above numbers equals the first one of them, $(r_1\mathrm{cis}\theta_1)^n = r_1^n\mathrm{cis}_n\theta_1$ or the nth power of the complex number. The quotient of $r_1\mathrm{cis}\theta_1$ by $r_2\mathrm{cis}\theta_2 = \frac{r_1}{r_2}\mathrm{cis}(\theta_1 - \theta_2)$, and $\sqrt[n]{r_1\,\mathrm{cis}\theta_1} = \sqrt[n]{r_1}\cdot\mathrm{cis}\,\frac{1}{n}\theta$.

By observing the changes in the modulus and amplitude, the results of any of these operations may be represented graphically. The variation of a function of a complex variable $x + yi$, due to the variation of x and y, is very important in the theory of equations and functions. Thus the fundamental proposition that every equation has a root is a consequence of Cauchy's theorem which asserts that the number of roots of any equation comprised within a given plane area is obtained by dividing by 2π the total variation of the amplitude of the function corresponding to the complete description, by the complex variable of the perimeter of the area.

The first appearance of the imaginary is found in the *Stereometria* of Heron of Alexandria (third century B.C.). Diophantus (supposed to have flourished in the third century A.D.) met these numbers in his algebraic work, but failed to give an explanation. Bhaskara (born 1114) recognizes the imaginary, but pronounces the roots involving $\sqrt{-1}$ to be impossible. Cardan (1545), in his *Ars Magna*, was the first mathematician who had the courage to use the square roots of negative numbers in computation. Bombelli, Girard, and Descartes (q.v.) formulated rules for the use of such quantities as $a + b\sqrt{-1}$, but founded no theory. Wallis (1685) made the first attempt to give a geometric interpretation. Euler (1770) still regarded these quantities as impossible. Thus it was reserved for Casper Wessel (1797), a Norwegian surveyor, to invent a graphic treatment of complex numbers. His method is contained in a memoir, presented to the Royal Academy of Science and Letters of Denmark, entitled *On the Analytic Representation of Direction*. For the early development of the subject, however, credit must be given to Argand, Gauss, Servois, and others, since Wessel's article (published in 1799 by the Royal Academy of Denmark) did not appear in French until 1897, 100 years after its presentation. Gauss did much to establish the underlying principles. Argand's memoir (1806), unquestionably an original and independent production, supplied the graphic theory that lay neglected in the work of Wessel. François Servois, Gergonne, and Cauchy did much to correct the errors of their predecessors and to generalize the theory of directed lines.

Complex number, being the most general type of algebraic number, has come to occupy a place of very high importance in modern analysis. It has led in recent times to the establishment of the theory of functions (q.v.) and quaternions (q.v.). Consult: Beman, "A Chapter in the History of Mathematics," in the *Proceedings of the American Association for the Advancement of Science* (Salem, 1897); Cauchy, *Cours d'analyse* (Paris, 1821); Warren, *A Treatise on the Geometric Representation of the Square Roots of Negative Quantities* (Cambridge, 1827); Chrystal, *Algebra*, part i (Edinburgh, 1889); Hankel, *Vorlesungen über die complexen Zahlen* (Leipzig, 1867); Durège, *Theorie der Functionen einer complexen veränderlichen Grösse* (ib., 1873), trans. by Fisher and Schwatt as *Elements of the Theory of Functions of a Complex Variable* (Philadelphia, 1896); Wessel's work above mentioned.

COMPLU'VIUM. See ATRIUM; IMPLUVIUM.

COMPONÉ, kŏm-pō'nā (Fr., composed), or GOBONY. In heraldry, a term describing a field or charge bearing a row of small squares, consisting of alternate metals and colors.

COMPOSITÆ, kŏm-pŏz'ĭ-tē (Lat. nom. pl., from *compositus*, p.p. of *componere*, to put together, from *com-*, together + *ponere*, to put, from *po-*, Gk. *ἀπό*, *apo*, off + *sinere*, to allow). The largest family of angiosperms, comprising approximately 1000 genera and over 13,000 species. This family is regarded as the culmination of the plant kingdom, i.e., the ranking family of plants. The nearest approach to it in number of species is the family Leguminosæ, with approximately 11,000 species. The familiar representatives of the family are such plants as the sunflower, aster, goldenrod, thistle, dandelion, etc. The name of the family is derived from the fact that the older botanists regarded the head of the flowers as a single flower, which they called a "compound flower." This so-called compound flower is really a community of flowers organized

together in a single structure called the *head.* Investing this head and resembling the calyx of an ordinary flower, is the *involucre,* which is a collection of bracts of various forms, colors, and relations to one another. The numerous small flowers stand upon a broad *receptacle,* which is ordinarily flat, but may be hemispherical to cylindrical. In some cases there are bracts upon this receptacle, among the flowers, in addition to the bracts upon the involucre that surround the whole head. These bracts of the receptacle are called *chaff,* and when they do not occur the receptacle is said to be *naked.*

There are two kinds of flowers which most commonly occur together in the same head. The outermost flowers usually have conspicuous petals and are called the *ray flowers.* The inner flowers, much the more numerous, form the *disk* within the ray flowers and are inconspicuous and tubular. In the sunflower, e.g., the yellow ray flowers are very conspicuous as contrasted with the numerous small flowers of the broad disk; while in the dandelion all the flowers have conspicuous corollas, so that there is no distinction between ray and disk flowers; in other cases there are no ray flowers, all the flowers being inconspicuous and tubular. These two kinds of flowers have been used to divide the Compositæ into two great series: *Tubuliflorœ,* those that have tubular flowers and also usually ray flowers; and *Liguliflorœ,* those that have no tubular flowers, all the flowers having conspicuous corollas, which are strap-shaped (ligulate).

The ordinary rôle of a calyx in protecting the more delicate parts within is taken by the involucre, and therefore, in the Compositæ the calyx is very much modified, being called the *pappus.* Familiar forms of pappus are a crown of delicate plumes, as in the dandelion and thistle down; a cluster of coarse bristles; barbed teeth as in Spanish needles, beggar-ticks, etc.; ordinary scales; or merely an inconspicuous crown. These various kinds of pappus have to do with the distribution of seeds, the plumed forms being carried about by the wind and the barbed forms catching in the fur of animals.

The stamens are very characteristic, the five filaments being distinct, but the anthers forming a tube. The anthers shed their pollen on the inside of the tube, through which the stigma is pushed by the elongation of the style, much as a swab is pushed through a cylinder. By this means the pollen is brought to the surface of the head, so that an insect moving about upon the head becomes dusted with it. The carpels are two in number, but mature as a dry seedlike fruit (*achene*) containing a single seed. The position of the achene indicates the advanced rank of the family, inasmuch as all the flower parts seem to rise from its apex (an epigynous flower).

There is great differentiation of flowers among the Compositæ in reference to the occurrence of stamens and pistils. All the flowers in a head may not have both of these organs. Among the Tubulifloræ the most common situation is to find the ray flowers without stamens, or with neither stamens nor pistils (neutral), while the tubular disk flowers have both. In some cases the disk flowers are "sterile," and the ray flowers "fertile." In one group of the Tubulifloræ the heads are differentiated, all the flowers of a head being either staminate or pistillate, and these two kinds of heads may occur on different plants. The two great series of Compositæ referred to are further divided into 13 tribes, whose names may be found in any manual. In the flora of the United States 10 of these tribes are represented, 9 of them belonging to the Tubulifloræ.

It is somewhat remarkable that the largest family of angiosperms contains so few plants that have been found to be of economic importance. Aside from a certain number of species cultivated for their flowers or foliage, some of the most economically important species of Compositæ are lettuce, salsify, artichoke. Of course, chicory, dandelion, tansy, chamomile, etc., are common plants, but cannot be regarded as of economic importance. Medicinal properties are claimed for quite a number of species, as arnica, wormwood, elecampane, coltsfoot, etc.

COMPOSITE NUMBERS. See PRIMES.

COMPOSITE ORDER. See COLUMN; ORDERS OF ARCHITECTURE.

COMPOSITE SHIPS. Ships built with iron or steel frames and wooden planking. In some cases the framing is stiffened by keel plates, stringers, deck plates, longitudinals, etc. The planking is bolted to the frames and sometimes additionally pinned edgewise to the planks on each side. It is almost invariably sheathed with copper as a protection against fouling—indeed, it is chiefly to provide against fouling that ships are composite built. This method of construction never had much vogue in the mercantile marine; in the navies of the world it is rapidly falling into disuse on account of the galvanic action of the copper upon the plating and propeller shafts and struts, and because ships need docking sufficiently often for other reasons than fouling of the bottom to render the superiority of coppered ships in this respect of less importance than their inferior strength and increased cost. See SHIPBUILDING.

COM'POSI'TION (from OF., Fr. *composition,* from Lat. *compositio,* connection, from *componere,* to put together). In painting, that ordered arrangement of light and shade, of color and line, which shall directly impress the beholder with the thought and idea the artist wishes to express. The most important requisite of composition is unity. Every object must form a harmonious part of the whole and be in distinct relation to the rest of the picture. As Millet said: "A work should be all of a piece, and people and things should be there for an end." Whatever their color or shape, all objects in the picture should be seen under like conditions of light, shade, and atmosphere. There should be some object or objects of special interest, to which the remainder of the picture should be strictly subordinated.

The subject treated and the individuality of the artist usually determine the composition of a picture. There are, however, some generally accepted maxims in regard to linear composition which should be mentioned. The perpendicular line is one of dignity and severity, and its predominance in a picture produces a simple, majestic effect (e.g., the early Italian portraits). The predominance of the horizontal line produces an effect of repose or solemnity, as is seen in the composition of most landscapes. The flowing or waving line is the line of beauty and grace, and it is for this reason that the drawing of the human figure is esteemed so important.

There have been many theories of composition, more or less arbitrary. The Italians generally use the pyramidal composition, in which the Madonna forms the apex of the pyramid, with a

balanced group of standing or kneeling saints on either side. As art advanced, they also used the oval composition, in which the figures form a circle on the canvas (e.g., Raphael's "Madonna della Sedia"), the arch (Correggio's "Coronation of the Virgin"), the diamond shape (Sistine Madonna), and others. In landscape the themes of composition were even more numerous. In modern composition there is greater freedom, the artist following his own inclination. Nevertheless, he usually leans upon some well-established principles, although he may not be conscious of them, since analysis is the work of the critic rather than of the artist. Millet is an excellent example of a free and original method of composition in the modern sense. Consult: J. C. Van Dyke, *Art for Art's Sake* (New York, 1901); Blanc, *Grammaire des arts de dessin* (Paris, 1882); Burnett, *Practical Treatise on Painting* (London, 1880).

COMPOSITION AND RESOLUTION OF FORCES AND MOTIONS. See MECHANICS.

COMPOSITION WITH CREDITORS. In law, an arrangement made by an insolvent debtor with several or all of his creditors, by which they accept the payment of a percentage of their claims in full satisfaction and discharge of the whole. An agreement between a debtor and a single creditor that the latter will discharge the former from all liability upon the former's payment of a part of the debt is void by common law, because, it is said, this payment is no consideration for the creditor's promise to relinquish the balance of the debt, being only a payment of what the debtor already owed and was legally bound to pay. An agreement between a debtor and several or all of his creditors possesses an additional element. Such an agreement is binding upon all, it is said, because each creditor promises to release the balance of his claim, over and above the percentage paid to him, in consideration of such payment and also in consideration of the promises of other creditors to do likewise. It is held to be the substitution of a new agreement with different parties for an old debt. If any of the creditors entering into such a composition agreement stipulates secretly with the debtor for a preference to himself, his stipulation is void. Bankruptcy statutes often provide for and regulate composition proceedings between the bankrupt and his creditor. See BANKRUPTCY; CONTRACT.

COM'POST (OF. *composte*, It. *composta*, Portug. *composto*, mixture, from Lat. *componere*, to put together). A mixture of fertilizing materials which has been subjected to fermentation. Composts are usually prepared by mixing animal manures or other readily putrescible substances with peat (q.v.), straw, leaves, road scrapings, mud, loam, etc., with a view to causing fermentation and chemical changes, which will render these substances more active as fertilizers than they were in their original condition. Similar results are sometimes brought about by the use of ashes, lime, marl (qq.v.), alkali salts, etc. Frequently also preservative substances, such as gypsum, kainit, superphosphate (qq.v.), etc., are added to prevent the loss of ammonia or of nitrogen in the free state, which is likely to occur during fermentation. Composting is thus not only a means of rendering the constituents of various more or less inert materials more available as plant food, but also of preventing loss of the most valuable constituent of manures, viz., nitrogen. A compost which was formerly quite popular consists of alternate layers of barnyard manure, 1 part, and peat, 1–5 parts, the proportion of the latter depending upon the fermentative power of the manure. In this mixture the peat prevents the loss of ammonia and the valuable manure liquids, and the manure sets up a fermentation in the peat which greatly increases the availability of the inert nitrogen in which this material is comparatively rich. When lime, ashes, or lime and salt mixtures are substituted for manure in the peat compost, the alkaline character of these substances promotes the decomposition of the peat in much the same way as the manure. The fermenting compost heap has been utilized for the reduction of bones and ground mineral phosphates; and meat, fish, slaughterhouse refuse, etc., are sometimes incorporated in it, but composts containing any considerable amount of the latter substances are likely to be very offensive. Moreover, these materials are less benefited by the process than more inert substances. Composting is an effective means of "killing," i.e., destroying the germinating power of cottonseed intended for use as a fertilizer. This is done in Furman's formula for cotton, which formerly had considerable celebrity and is as follows: Barnyard manure, 750 pounds; cottonseed, 750 pounds; acid phosphate, 367 pounds; kainit, 133 pounds. The plan of composting these materials, which well illustrates the methods of composting in general, is briefly as follows: Put down on an impervious dirt floor first a layer of manure, then of cottonseed, and lastly of acid phosphate, in the proportions given, distributing the kainit throughout the different layers. Repeat the layers to any desired extent and cover the heap with absorbent earth. The heap should be kept moderately moist, and if made in the autumn should stand until spring, when it is dug down, mixed, and applied. Although composting furnishes a valuable means of converting waste materials of the farm into more active and better-balanced fertilizers, the labor involved is so great as to render the practice of doubtful economy for general agricultural purposes, especially since the general introduction of the more concentrated and active commercial fertilizers. (See MANURES AND MANURING.) Composts have been recommended especially for use on grass lands and on stiff soils or on those deficient in humus. They find their greatest usefulness, however, in horticultural operations—for plant beds, potting, and for use on vines, fruits, etc., which might be injured by more concentrated fertilizers. Perennial plants, or those having long periods of growth, will utilize the fertilizing matter of composts to the best advantage. Composts are not so well suited to the forcing of quick-growing crops as commercial fertilizers. For further information regarding composts, consult: Dana, *Muck Manual for Farmers* (4th ed., New York, 1858); Storer, *Agriculture in Some of its Relations with Chemistry* (7th ed., ib., 1897); Johnson, *Peat and its Uses as Fertilizer and Fuel* (ib., 1866); Sempers, *Manures: How to Make and How to Use Them* (Philadelphia, 1893); Brooks, *Agriculture* (Springfield, Mass., 1901); Thorne, *Farm Manures* (New York and London, 1913).

COM'POSTEL'LA, ORDER OF SAINT JAMES OF, OR ORDER OF SAINT JAMES OF THE SWORD. An order of knighthood in Spain. To defend the multitude of pilgrims that thronged to the shrine of St. James at Compostella (Santiago), in

Galicia, Spain, from the Moors, 13 noblemen formed themselves into a military order, under the auspices of the Pope, in 1175. With time the order rose to immense power and wealth. It fought valorously in all the Moorish wars and exercised great political influence. But its rich towns and abbeys tempted Ferdinand and Isabella, who took possession of its property in 1493 and held it until 1522, when a papal bull vested the permanent grand mastership in the crown.

COMPOUND, CHEMICAL. See CHEMISTRY.

COM'POUND ANIMALS. Such animals as are made up of a number of morphological units, called *persons*, which are organically connected throughout life. The connection results from a budding process, in which the buds never become separated from the parent stock. Compound animals are found among protozoans, sponges, cœlenterates, certain flatworms (planarians and tapeworms), bryozoans, some annelids (*Syllis*), and tunicates. The degree of connection varies. When it is loose, the complex is called a "stock"; when close, a "corm," as in sponges. Most compound animals are sessile, but the siphonophores, flatworms, and some tunicates swim free. The opposite of this term is "simple animals."

COMPOUND BLOWPIPE. See OXYHYDROGEN BLOWPIPE.

COMPOUND FRACTURE. A fracture of a bone accompanied by a wound which opens from the surface of the body to the break in the bone. Infection of the bone being thus rendered possible, a compound fracture is more serious than a simple fracture. See FRACTURE.

COMPOUNDING OF FELONY. The offense of taking value for forbearing to prosecute a felony. This offense is punishable with fine and imprisonment. Compounding of informations upon penal statutes and compounding of misdemeanors are also illegal and are punishable in a lighter degree. In Great Britain the compounding of misdemeanors is permitted in some cases with the leave of the court, especially in the case of a misdemeanor affecting private (and not public) rights. Accepting a promissory note signed by a party guilty of larceny, as a consideration for not prosecuting, is enough to constitute the offense; but the mere retaking of stolen goods by the owner is not an offense, unless it is agreed that the thief is not to be prosecuted. A note or other obligation given in consideration of stopping a criminal prosecution or an agreement not to prosecute is void. See CRIMINAL LAW, and the authorities there referred to.

COMPOUND INTEREST. See INTEREST.

COMPOUND MICROSCOPE. See MICROSCOPE.

COMPOUND PIER. See CLUSTERED PIER.

COM'PRADOR' (Sp., Portug., purchaser). In China, Japan, and the Philippines, a man who contracts for the supply of provisions to ships.

COMPRESSED AIR. See POWER TRANSMISSION; AIR COMPRESSOR; COMPRESSED-AIR ENGINE; COMPRESSED-AIR LOCOMOTIVE; PNEUMATIC TOOLS; PNEUMATIC DISPATCH.

COMPRESSED-AIR ENGINE. An engine using as a motor fluid air to which a degree of energy has been imparted by compression by mechanical means. When atmospheric air is compressed in an air compressor (see AIR COMPRESSOR), energy is stored in it which is available for work in a piston motor just as in the energy stored by heat in steam. Any form of engine which will operate with steam as a motive fluid will also operate with compressed air as a motor fluid; i.e., a steam engine will become a compressed-air engine simply by disconnecting the steam boiler and substituting a receiver or reservoir of compressed air. Compressed air is, however, employed to replace steam only under those conditions in which it is necessary to transmit the motor fluid to motors located at scattered points some distances from the source of supply; and where the exhaust steam would be objectionable, while the exhaust air is not, as in mines or confined chambers or submarine vessels; and where the energy must be carried on a vehicle without heat, as on street railways. The reason for this is that while it is not possible to convey steam through pipes or to carry it in inclosed vessels for long distances without a great loss of energy due to condensation, it is practicable to do this with compressed air, with a comparatively small loss of energy if the air be heated before it is delivered to the motors at the end of its journey. Hence compressed-air engines are practically always motors of special forms for performing special operations and are usually of small size. For descriptions of the various special forms of compressed-air engines in common use, see DRILL: PNEUMATIC TOOLS; POWER TRANSMISSION; STREET RAILWAY.

COMPRESSED-AIR LOCOMOTIVE. A locomotive engine in which air under pressure takes the place of steam as the propulsive force. Compressed-air locomotives occupy a rather limited field of usefulness, their chief applications being street-railway propulsion on a limited scale, mine, quarry, and tunnel haulage, and haulage around cane plantations, saw mills, cotton presses and warehouses, textile works, and powder mills, where the risk of fire has to be carefully avoided. Structurally, a compressed-air locomotive has the same form of propelling mechanism as a steam locomotive, but in place of the boiler there are tanks for holding compressed air, these tanks being recharged at intervals at a stationary air-compressor plant. A brief description of the use of compressed-air locomotives for street-railway propulsion and for mine haulage will give a fair idea of the two distinctive classes of these motors.

Street Railway Motor Cars. Numerous attempts have been made in the United States to employ compressed air for propelling street-railway cars; but, with the exception of a few short lines operating under special conditions, these attempts have all resulted in commercial failures. Probably the most extensive experiments have been conducted in New York City, on some of the railway lines crossing the city from east to west. In all of these experiments a motor-driven car has been employed carrying the tanks underneath the seats or under the floor of the car. In Europe the Mekarski system of compressed-air street-car locomotion has been used apparently with considerable success in Paris, France, and Berne, Switzerland. A special feature of the Mekarski system is the heating of the air, to maintain it at a constant temperature, by passing it through superheated water at 330° F. The air thus becomes saturated with steam, which subsequently partly condenses, its latent heat being absorbed by the expanding air. The pressure used at Berne in the car reservoirs is 440 pounds per square inch. The engine is constructed like an ordinary steam

tramway locomotive and drives two coupled axles spaced 5.2 feet apart. It has a pair of outside horizontal cylinders, 5.1 by 8.6 inches; four coupled wheels, 27½ inches in diameter. The total weight of the car, including compressed air, is 7¼ tons. The storage tanks consist of 10 sheet-iron cylinders with an aggregate capacity of 64¼ feet of compressed air. The cars will run for 4 miles without refilling the reservoirs. On the Paris lines the pressure used is 547 pounds, and the cars make trips of 7 miles without refilling the reservoirs.

Mining Locomotives. As generally constructed, the air for mining locomotives is stored in one or two steel tanks having a cubic capacity designed for the length of run, weight of train, grades, etc. These tanks usually occupy the space that the boiler does on an ordinary steam locomotive. The air from the main tank or tanks is conducted through copper-pipe connections to an auxiliary reservoir of suitable diameter. The pressure in this auxiliary tank can be regulated (usually 150 pounds) anywhere from 30 pounds up to 300 pounds, as required. The air is reduced and controlled from the main tank by a reducing valve and stop valve, and can be regulated to any pressure at a moment's notice; when once set, a constant pressure is maintained in the auxiliary reservoir. The air is fed to the engine cylinders from the auxiliary reservoir. Compressed-air locomotives for industrial uses are built substantially the same as mining locomotives. Electric locomotives have largely replaced the air-propelled types.

From the preceding it will be seen that the two types of compressed-air locomotives are the compressed-air motor car for street-railway propulsion and the compressed-air locomotive proper for mine, plantation, and factory haulage. In both forms the original prime motive power is usually steam, or a head of water whose energy, as it comes from the boiler or hydraulic motor, is employed to drive the air compressors; and, as transformed and stored in the compressed air, to propel the car motor or locomotive proper. See AIR COMPRESSOR; COMPRESSED-AIR ENGINE.

COMPRESSED-AIR TREATMENT. A term applied to the use of air under pressure for therapeutic purposes. The treatment is administered in one of the following two ways: (1) by causing the patient to enter an air-tight chamber, in which air is forced under pressure till the desired density is obtained; (2) by causing the patient to enter a cabinet in which he is seated in such a position as to receive into his mouth the end of a tube which, passing through the front of the cabinet, connects the cavity of his lungs with the outside atmosphere, while an apparatus on the roof of the cabinet is so arranged as to pump air out of the cabinet. In the air-tight room the pressure upon all parts of the patient's body, including the lung cavity, is the same. In the cabinet the pressure within the lung cavity is many times greater than on the rest of the body, thus causing great expansion of the lungs and chest. The latter treatment relieves collapse of pulmonary vesicles and consolidations in many cases; the former treatment is said to cause increased absorption of oxygen and an improved function of the mucous membrane of the respiratory tract. Both methods of treatment are used in cases of tuberculosis, and the former also in chronic bronchitis and asthma, at certain water cures. See AËROTHERAPEUTICS; TUBERCULOSIS; CAISSON DISEASE.

COMPRESSIBILITY (from Lat. *compressus*, p.p. of *comprimere*, to compress, from *com*, together + *premere*, to press). That property of bodies by which they admit of being pressed into less space than they otherwise occupy. It is measured by the relative change of volume produced by the application of unit pressure. The particles composing bodies are in all cases at greater or less distance from one another; and whatever brings the particles closer together diminishes the volume or bulk of the body. This may be effected by various agencies, as, e.g., by the withdrawal of heat, but the effect is called compression only when it is caused by mechanical force, as by pressure or by percussion. All bodies are compressible, but in different degrees. Solids and liquids were at one time believed to be incompressible; more accurate experiments, however, have proved that this is not the case; water, e.g., subjected to a pressure of 15,000 pounds to the square inch, loses one-twentieth of its volume, and under greater pressures the loss of volume is still greater. The law connecting the pressure and volume of solids or liquids at constant temperature is as yet unknown; it will probably remain unknown until the molecular condition of substances in these states of aggregation is more perfectly understood than it is to-day. Gases are strikingly compressible, and by means of a common air pump a very large amount of air can be forced into the space of one cubic inch. The variation of the volume of a gas with the pressure is expressed by the law of Boyle and Mariotte as long as the pressure is moderate. Under greater pressures gases follow approximately the law of Boyle and Mariotte as modified by Van der Waals. See GAS; MOLECULES—MOLECULAR WEIGHTS.

COMPRES'SOR. An instrument used on shipboard for temporarily checking the running of the anchor chain. It consists usually of a curved arm pivoted at one end and arranged to be swung across the underside of the chain pipe through the deck and grip the chain by pressing it against the lip of the pipe. The term was also applied to an attachment to old-type guns for checking the recoil by squeezing two or more surfaces together and thus increasing the friction.

COMPRESSOR, AIR. See AIR COMPRESSOR.

COM'PROMISE MEASURES OF 1850, or OMNIBUS BILL. A name popularly given to a series of measures passed by the United States Congress in 1850, directed to a general settlement of certain questions arising out of the struggle over slavery. The affirmance of American rights in the Oregon territory, by the Treaty of 1846 with England, and the acquisition of still larger territories from Mexico by the Treaty of Guadalupe-Hidalgo (q.v.), made urgent the problem of providing suitable governments for this territory, and at the same time made acute the controversy between North and South over the securing of acceptable provisions concerning slavery in the statutes organizing such governments. One phase of this controversy ended with President Polk's approval, Aug. 14, 1848, of a bill providing for the erection of territorial government in Oregon with a prohibition against slavery. With reference to the territory acquired from Mexico, the problem was complicated by the fact that Mexico had abolished slavery in her dominions, by the question whether the line of the Missouri Compromise (q.v.) extended to the Pacific, and also by the question whether Congress might admit into the Union

a State which had not passed through the Territorial stage of organization. The necessity of an early decision was emphasized by the sudden peopling of much of this Territory, incident to the discovery of gold. Under such circumstances Henry Clay offered in the Senate, on Jan. 29, 1850, a general scheme of adjustment, which provided that California should be admitted as a State with her free constitution; that Territorial governments should be created in the other portions of the Mexican cession without reference to slavery; that trading within the District of Columbia in slaves brought there for purpose of sale should be forbidden; that there should be a more stringent fugitive-slave law; and that Texas should release all claims on New Mexico in return for the assumption by the national government of the old Texan debt. These proposals were attacked both by the Southern friends of slavery and by the more extreme antislavery element at the North. After several weeks of heated debate, including the last speech of Mr. Calhoun (q.v.) and the famous Seventh of March speech of Mr. Webster (q.v)., the whole matter was referred to a committee of 13, from which committee, on May 8, Mr. Clay reported three bills. The first provided, in addition to details as to the debt and boundary of Texas, for the admission of California with its antislavery constitution, and for the Territorial organization of Utah and New Mexico (then including the present Arizona) in such form that slavery should be allowed in those Territories. The second bill provided for a modified fugitive-slave law. The third bill provided for the abolition of the slave trade in the District of Columbia. Three months even then were occupied with animated and protracted discussions, with the result that the whole scheme of compromise seemed to have proved a failure. Mr. Fillmore, however, having succeeded to the presidency upon the death in July of President Taylor, adopted a policy more favorable than had his predecessor to the measures proposed, with the result that practically the whole of Clay's plan eventually became law, although divided into several statutes. The Senate passed the bill for the organization of Utah on August 1, that concerning Texas on August 9, that for the admission of California on August 13, that concerning New Mexico on August 15, the new fugitive-slave law on August 26, and, finally, the law prohibiting the slave trade in the District of Columbia on September 16. Before the end of September all these bills had passed the House and had been signed by the President. The arrangement thus effected was accepted by both parties in the campaign of 1852, in the "finality" planks of their platforms, and the slavery question was generally regarded as settled. The quiet was broken abruptly, however, and the whole controversy renewed with increased bitterness when Stephen A. Douglas (q.v.) introduced his bill for the organization, in 1854, of Kansas and Nebraska, and thus precipitated the battle anew both on the fields of Kansas and in the halls of Congress.

In the first volume of Rhodes, *History of the United States from the Compromise of 1850* (new ed., New York, 1901), a careful review is given of all the circumstances connected with this famous compromise, including sketches of the chief participants in the debates. A shorter review of the situation is given in the fifth volume of Schouler, *History of the United States under the Constitution* (Washington, 1889). The lives of statesmen of the period should also be consulted. See SLAVERY.

COMPTOM'ETER. See CALCULATING MACHINES.

COMP'TON, EDWARD (MACKENZIE) (1854–). An English actor, born in London. He made his first appearance at the new Theatre Royal, Bristol, in 1873, and his first appearance in London at Drury Lane in 1877. He accompanied Adelaide Neilson on her American tour, returning in 1880. In 1881 he organized the Compton Comedy Company, and with this organization during a period of 30-odd years he built up a repertory of more than 50 plays. In 1911 he was associate manager of the Kennington Theatre, and in 1912 and 1913 he toured as Nobody in *Everywoman.*

COMPTON, HENRY (1632–1713). An Anglican bishop of Oxford (1674) and of London (1675). He was born at Compton Wyngates and was educated at Oxford. He was the tutor of the daughters of James II, Mary and Anne, who through his teachings became attached to the Protestant faith. In 1686, at the instigation of James, he was suspended by the high court of ecclesiastical commission from further exercises of episcopal functions, on the alleged ground of having permitted the preaching of controversial sermons within his dioceses. This suspension was reversed in 1688. Compton was one of the active leaders of the revolution of 1688, and he used his influence to have William and Mary crowned King and Queen of England. He presided over the Upper House of Convocation in 1689 and assisted in the revision of the liturgy.

COMPTROLLER, kon-trōl'er, or **CONTROL'LER** (OF. *contreroleur,* Fr. *contrôleur,* from ML. *contrarotulator,* keeper of a check roll). An officer who keeps financial accounts or sees that they are properly kept and audited. In the United States Treasury Department the Comptroller of the Treasury supervises and reviews the actions of the various auditors of the Treasury, upon appeal, advises the heads of departments as to constructions of laws, and countersigns all warrants of the Secretary of the Treasury. The Comptroller of the Currency has charge of the execution of the laws relating to the issue and regulation of the national bank currency and has a general supervision of the national banks. By the Banking Act of Dec. 23, 1913, the Comptroller is made a member of the Federal Reserve Board, having supervision over the reserve system created by the law. State and municipal comptrollers in the United States have duties similar to those of the Federal officials.

COM'PURGA'TION (Lat. *compurgatio,* purification, from *compurgare,* to purify, from *com-,* together + *purgare,* to purge, from *purus,* pure + *agere,* to perform). An ancient method of proof in legal proceedings, generally known in England as the "wager of law." It consisted in the purgation, i.e., the purging or clearing, of a defendant by the sworn oaths of a certain number of other persons. The procedure was singular in this, that the witnesses swore, not to their knowledge of the fact in issue, but to their belief that the defendant was telling the truth. The number of compurgators was often 12; but it varied according to the rank of the person accused and according to the seriousness of the crime or action. It was seldom employed when the proof of the crime was accessible.

When it had been allowed and proof of the man's guilt was afterward obtained, the compurgators usually suffered the same penalty as the accused. The procedure was available in many forms of civil suit and in criminal proceedings. Compurgation was employed as a part of the regular procedure of the ecclesiastical courts throughout Europe in the Middle Ages. It existed among the Anglo-Saxons and was in use in the courts of the common law in England until it was gradually superseded by the jury system. Though long obsolete, it was revived in England in an action of debt as late as 1824 (Ring *v.* Williams, 8 Barn. and Cress. 5387). It was not until 1833 that it was finally abolished by Act of Parliament (2 and 3 Will. IV, c. 42, § 13). In other European countries, except Spain, it was in use later than in England; in Italy it was employed in a clerical court in November, 1904. It never existed in the legal procedure of the United States or of the English Colonies in America. See JURY; OATH; PROOF; WITNESS. The procedure is elaborately discussed by Blackstone, *Commentaries on the Laws of England.* See also Inderwick, *The King's Peace: A Historical Sketch of English Law Courts* (London, 1895); Stephen, *History of the Criminal Law of England* (ib., 1883); Pollock and Maitland, *History of English Law* (2d ed., Boston, 1899); Lea, *Superstition and Force* (4th ed., Boston, 1892).

COM'STOCK, ANTHONY (1844–1915). An American reformer, born in New Canaan, Conn. He was educated at high schools in his native State and during the Civil War served in the Union army from 1863 to 1865. Afterward he became an active worker in the Young Men's Christian Association in New York City and upon the organization of the Society for the Suppression of Vice in that city (1873) was appointed chief special agent. Thereafter he attained considerable prominence by his vigorous crusade against such books, papers, pictures, and establishments as he considered injurious to the public morals. He published. *Frauds Exposed* (1880); *Traps for the Young* (1883); *Gambling Outrages* (1887); *Morals Versus Art* (1887); and magazine articles relating to similar subjects.

COMSTOCK, CYRUS BALLOU (1831–1910). An American soldier and military engineer. He was born in West Wrentham, Mass., graduated at West Point in 1855, was appointed lieutenant engineer, and from 1859 to 1861 was assistant professor of natural and experimental philosophy at the Military Academy. After serving in the construction of the defenses of Washington and with the Army of the Potomac in 1862 he became chief engineer of that army. He was subsequently engaged in the siege of Vicksburg, was chief engineer of the Army of the Tennessee in 1863, was assistant inspector general of the Division of the Mississippi in 1863–64, and senior aid-de-camp to General Grant in 1864–66. At the close of the war he was brevetted major general of volunteers and brigadier general in the regular army, and from 1866 to 1870, was aid-de-camp to the general in chief, with the rank of colonel. Afterward for several years he was superintending engineer of the geodetic survey of the Northern and Northwestern lakes. In 1888 he became colonel in the engineer corps and was retired from active service in 1895. He was promoted on the retired list to be brigadier general in 1904. His publications include: *Notes on European Surveys* (1876); *Survey of the Northwestern Lakes* (1877); *Primary Triangulation United States Lake Survey* (1882); *A Comstock Genealogy* (1907).

COMSTOCK, GEORGE CARY (1855–). An American astronomer, born at Madison, Wis. He graduated at the University of Michigan in 1877 and in law at the University of Wisconsin (1883). He also studied mathematics and astronomy and in 1881 was appointed assistant astronomer at the Washburn Observatory of the University of Wisconsin. In 1885 he was made professor of mathematics at the Ohio State University, but in 1887 returned to the University of Wisconsin as associate director of the observatory, of which he was afterward made head director. He became a member of many scientific bodies. His works include: *Method of Least Squares* (1890); *Publications of the Washburn Observatory; Observations of Double Stars,* vols. vi–xii (1896–1906); *Text-Book of Astronomy* (1900); *Text-Book of Field Astronomy for Engineers* (1902; 2d ed., 1908).

COMSTOCK, JOHN HENRY (1849–). An American entomologist, born at Janesville, Wis. He was educated at Cornell University, where he became first instructor, then assistant professor, and, in 1882, professor of entomology and general invertebrate zoölogy. From 1878 to 1881 he was United States entomologist. In 1891 he became nonresident professor of entomology at Leland Stanford Junior University. His investigations deal with the morphology, classification, and economic relations of insects. In this work he has been assisted by his wife, Anna Botsford Comstock, who is herself an entomologist and prominent in the educational movement emanating from Cornell University towards the general extension of nature study. His important publications include: *Report on Cotton Insects* (1879); *Annual Report of the Entomologist* (1879–81); *Introduction to Entomology,* part i (1888); *Evolution and Taxonomy* (1893); *A Manual for the Study of Insects,* with his wife, Anna Botsford Comstock (1895); *The Wings of Insects,* with J. G. Needham (1897); *Insect Life* (New York, 1901); *How to Know the Butterflies of the Eastern United States,* with his wife (1904); *The Spider Book* (New York, 1912).

COMSTOCK, JOHN LEE (1789–1858). An American author of textbooks. He was born at Lyme, Conn., and after a common-school education took up the study of medicine. He served as assistant surgeon in the War of 1812 and at its close settled in Hartford, where he devoted himself to writing and the preparation of textbooks on the various sciences and history. His *System of Natural Philosophy* (1831) reached a sale of 900,000 copies, while other popular works from his pen were an *Introduction to Mineralogy* (1832); *History of the Precious Metals* (1849); *History of the Greek Revolution* (1828).

COMSTOCK, THEODORE BRYANT (1849–). An American geologist, born at Cuyahoga Falls, Ohio. He graduated at the Pennsylvania State College in 1868 and at Cornell in 1870 and in 1873 accompanied Capt. W. A. Jones's Wyoming and Yellowstone Park expedition as geologist. From 1875 to 1879 he was professor of geology and paleontology at Cornell, where he established the department of economic geology. He acted in 1879–84 as general manager of a mining company at Silverton, Cal., and from 1884 to

1889 occupied the chair of mining engineering and physics at the University of Illinois. He was assistant State Geologist of Arkansas in 1887–88 and of Texas in 1889–91; in the latter year he founded the Arizona School of Mines, which he directed until 1895, and from 1893 to 1895 was president of the University of Arizona. In 1886 he was elected secretary of the geological and geographical section of the American Association for the Advancement of Science. He published *The Scientific Value of the Yellowstone Park* (1874); *Outline of General Geology* (1878); *Classification of Rocks* (1877); and many papers dealing with the geology and mineral deposits of Colorado, Texas, Wyoming, and other parts of the West.

COMSTOCK LODE. A remarkable compound-fissure vein, rich in gold and silver, located in Storey Co., Nev., on the eastern slope of Mount Davidson, a northeastern spur of the Sierras, at a point about 20 miles east of the California State line. Its discovery in 1859, when it received the name "Washoe," created great excitement and led to the building up of Virginia City. The vein is about 4 miles in length and varies in width from zero at the ends to 3000 feet at the middle point. It occupies a zone of displacement in igneous rocks, chiefly andesites of Tertiary age. The ore, which is of high grade, containing both silver and gold in proportion of three of the former to two of the latter, occurs in great pockets known as bonanzas, chiefly along the eastern portion of the vein. The excavations along this fissure vein have been carried to great depths, approximating 3500 feet, until operations became difficult through the inflow of hot water with a temperature of 170° F. The Sutro Tunnel, with a length of 4 miles, was driven with a view to draining this water, but with only partial success. The richness of the ore of this lode may be realized from the value of the product, the total value during the years 1860–90 having been $340,000,000; the greatest output for a single year was $38,000,000 in 1877. Since 1890 the production has declined.

Besides its economic value, the Comstock Lode is of great interest in other directions. One of the earliest classifications of igneous rocks (q.v.) was attempted in connection with the study of the geologic relations of the ore bodies by Von Richthofen in 1868; and Van Hise, Iddings, and Becker have at a later period perfected the modern classification of igneous rocks with the aid of considerable information derived from the Comstock Lode and Sutro Tunnel. Also many important observations have been made on the relation between the size of grain and the rate of cooling, and upon the rate of development of crystallization in igneous rocks. Again, experiments have here been carried on by Carl Barus with the object of determining the temperature variations and electric manifestations in the deeper workings. For more precise information on the geologic features and methods of mining of the Comstock Lode, the reader is referred to the following works: Becker, "Geology of the Comstock Lode and Washoe District," with folio atlas; being *Monograph of the United States Geological Survey*, vol. iii (Washington, 1882); Lord, "Comstock Mining and Miners," *Monograph of the United States Geological Survey*, vol. iv (ib., 1883); Reid, *Structure and Genesis of the Comstock Lode* (Berkeley, Cal., 1905).

COMTE, kōNt, ISIDORE AUGUSTE MARIE FRANÇOIS XAVIER, known generally as AUGUSTE COMTE (1798–1857). A celebrated French philosopher, the founder of the positive philosophy, or positivism (q.v.). He was born at Montpellier, and educated at the Ecole Polytechnique in Paris, from which he was expelled for his part in a protest of students against one of the instructors. From 1816 he supported himself by tutorial work. In Paris he met Saint-Simon, with whose theories he was at first greatly charmed, but from whose influence he broke away in 1824. In the following year he married Caroline Massin, but the union was unhappy. In 1826 he began a course of lectures at his own house on his system of philosophy and had among his hearers such men as Humboldt and Blainville. Excessive work, however, ruined his health, and after the third lecture he became insane, was taken to an asylum, and tried to commit suicide. He soon recovered the use of his faculties and took up his studies and lectures again. In 1836, he got a position as examiner for entrance to the Ecole Polytechnique, which he held for some 10 years; afterward he was largely supported by his pupils and admirers. John Stuart Mill, with whom Comte had been in correspondence for some time, induced some wealthy English friends to advance about $1200 to Comte in 1845. In 1848 Littré headed an appeal for a public subscription for the benefit of Comte, who subsisted on the proceeds of it for the remainder of his life. In 1845 he met Clotilde de Vaux, whose husband was serving a life sentence, and conceived an extravagant affection and admiration for her. The relation was broken by her death a year later, after which Comte had a second attack of mental alienation. His death took place on Sept. 5, 1857.

Comte published a number of important philosophic works, the most famous being his *Cours de philosophie positive* (6 vols., 1830–42), of which a condensed English translation by Harriet Martineau, approved by the author, appeared in 1853. Other works were: *Traité élémentaire de géométrie analytique* (1843); *Traité d'astronomie populaire* (1845); *Système de politique positive* (4 vols., 1851–54; Eng. trans., London, 1875–77); *Catéchisme positiviste, ou sommaire exposition de la réligion universelle* (1852). Comte's central and governing doctrine is that the human race, like the individual, necessarily passes through three intellectual stages: (1) the theological, in which a supernatural origin is sought for all phenomena, and the *deus ex machina* is the only explanation of events; (2) the metaphysical, in which the sensuously supernatural is set aside, and an effort is made to demonstrate the existence of "abstract forces or entities supposed to inhere in various substances and capable of engendering phenomena"; (3) the positive, in which the mind affirms the futility of both theological and metaphysical inquiries, abandons all vain search after the causes and essences of things, and "restricts itself to the observation and classification of phenomena, and to the discovery of the invariable relations of succession and similitude which things bear to each other—in a word, to the discovery of the laws of phenomena." Theology and metaphysics are alleged to be in their dotage, and all the anarchy of modern life to arise from the presence of these disturbing elements. To deliver us from their hurtful influence, Comte

employs the principles of positivism to organize a new social doctrine, which shall embrace the entire wants of man as an intellectual and emotional being. He thus aims at being the founder, not only of a new philosophy, but also of a new religion, and even assumed the title of *Fondateur de la réligion de l'humanité*. See POSITIVISM; and consult: Littré, *Auguste Comte et la philosophie positive* (Paris, 1877); Mill, *Comte and Positivism* (London, 1865); Caird, *The Social Philosophy and Religion of Comte* (Glasgow, 1885); Gruber, *August Comte, sein Leben und seine Lehre* (Freiburg, 1889); the first volume of Fiske, *Outlines of Cosmic Philosophy* (Boston, 1874); Levy-Bruhl, *La philosophie d'Auguste Comte* (1900, Eng. trans., 1903); L. de Montesquieu Fezensoc, *Le système politique d'Auguste Comte* (1907).

COMTE DE BOURSOUFLE, kōNt de bo͝or'-so͞o'fl', LE (Fr., The Count of Boursoufle). A comedy by Voltaire, produced in public, posthumously, in 1862. It had been privately acted, however, at the Château de Circy in 1734, and again at the Château d'Anet in 1747, under the title of *Quand est-ce qu'on me marie?* It was drawn from Vanbrugh's *Relapse*.

COMTE DE PARIS, de pȧ'rē'. See PARIS, LOUIS PHILIPPE ALBERT D'ORLÉANS, COMTE DE.

COMUM. See COMO.

CO'MUS (Lat., from Gk. Κῶμος, *Kōmos;* compare κῶμος, revel, or band of revellers). A Greek god of revelry, who first appears clearly personified in the third century A.D. (See PHILOSTRATUS, 3, 4.) Philostratus describes Comus as a winged youth slumbering in a standing attitude, his legs crossed, his countenance flushed with wine, his head sunk upon his breast, his left hand feebly grasping a hunting spear, his right hand an inverted torch. Milton, in his poem "Comus," has represented Comus as born from the loves of Bacchus and Circe, "much like his father, but his mother more"; a sorcerer, who gives to travelers a magic draught that changes the human face into the "brutal form of some wild beast," and makes them, hiding from them their own foul disfigurement, forget all the purities of life, "to roll with pleasure in a sensual sty."

COMYN, kŭm'ĭn. A family which rose to great power and eminence in Scotland after the Norman Conquest. The name is also spelled Comin, Comines, or Cumin.—ROBERT DE COMYN, the founder of the family, was probably from Flanders and followed William the Conqueror to England. He was made Earl of Northumberland in 1068. In 1069 he was sent to reduce the provinces of the North. He seized Durham, but the people rose against him, and he perished in the flames of the Bishop's palace. The family became most prominent in the thirteenth century.—WILLIAM COMYN, who died in 1233, obtained the earldom of Buchan by marriage. WALTER, one of his sons by his first marriage, became Earl of Monteith. After the accession of Alexander III of Scotland, Walter practically ruled the kingdom till 1255. He died in 1258.—ALEXANDER, Earl of Buchan, his half-brother, by marrying a daughter of the Earl of Winchester, acquired, in 1270, the high office of Constable of Scotland, with great estates in Galloway, Fife, and the Lothians. He was the most powerful noble in Scotland until his death, in 1289. Within a quarter of a century, however, this great house suffered such utter misfortune that, in the words of a contemporary chronicle, "there was no memorial left of it in the land, save the orisons of the monks of Deer" (a monastery founded by William Comyn, Earl of Buchan, in 1219). The Comyns perished in the memorable revolution which placed Bruce on the throne of Scotland. Their chief, the Lord of Badenoch, was in 1291 an unsuccessful competitor for the crown, as a descendant, through King Donald Bane, of the old Celtic dynasty. His son, Red JOHN COMYN, was one of the three wardens of Scotland and distinguished himself by his gallant resistance to the English. He fell under Bruce's dagger, before the altar of the Franciscan Friars at Dumfries, in 1306; and his kindred went down, one after another, in the struggle to avenge him.—JOHN COMYN, Earl of Buchan, was defeated by Bruce in a pitched battle near Inverary in 1308, and his earldom was laid waste. He fled to England, and died in 1313, leaving no children. The possessions of the family, both in Scotland and England, were taken by the King. Consult Douglas, *Peerage of Scotland* (Edinburgh, 1764), and Burton, *History of Scotland* (8 vols., Edinburgh, n.d.).

CON. An Italian preposition, meaning 'with,' much used in musical terminology; thus, *con spirito, con brio.* The form *col*, a contraction of *con* and *il*, means 'with the.'

CONACHAR, kŏn'ȧ-kär. A character in Scott's novel *The Fair Maid of Perth.*

CONAN'ICUT. An island of the State of Rhode Island at the mouth of Narragansett Bay (Map: Rhode Island, C 4). It is about 8 miles long by 1 mile wide and comprises the township of Jamestown. The village of the same name lies on the east coast of the island, about 2½ miles nearly due west of Newport. At the northern extremity of the island is Conanicut Park. The township was incorporated in 1678 and was named in honor of King James II. Pop. (of township), 1910, 1175.

CO'NANT, CHARLES ARTHUR (1861–1915). An American expert on banking and finance. He was born in Winchester, Mass., studied in public schools and with private tutors, and from 1889 to 1901 was correspondent in Washington, D. C., for the New York *Journal of Commerce.* He did important work for the gold standard and the gold-exchange standard and aided in the development of a monetary system in the Philippines. An Imperialist, on this and the monetary issue, he left the Democratic party. He was treasurer of the Morton Trust Company of New York City in 1902–06; was a member of the New York Chamber of Commerce committee on currency reform (1906) which recommended a central bank; and in 1910 was American delegate to The Hague Conference on Bills of Exchange. He wrote many articles for periodicals and encyclopædias on American banking and on Latin-American finance and trade, and published: *A History of Modern Banks of Issue* (1896; 4th ed., 1909); *Alexander Hamilton* (1901); *Wall Street and the Country* (1904); *The Principles of Money and Banking* (1905; also French trans.).

CONANT, HANNAH O'BRIEN CHAPLIN (1809–65). An American biblical scholar. She was born in Danvers, Mass., the daughter of a clergyman, and in 1830 was married to Thomas Jefferson Conant. In 1838 she became the editor of *The Mother's Journal.* She assisted her husband, translated from the German Strauss's *Baptism in Jordan* (1844), Neander's commen-

tary on Philippians (1851), and Uhden's *The New England Theocracy* (1859), and wrote *The Earnest Man*, an excellent biography of Adoniram Judson (1855), and a *Popular History of English Bible Translation* (1856).

CONANT, THOMAS JEFFERSON (1802–91). An American biblical scholar. He was born at Brandon, Vt., graduated at Middlebury College (Middlebury, Vt.) in 1823, and was professor of Greek, Latin, and German in Waterville College (now Colby College) in 1827–33. From 1835 to 1850 he was professor of biblical literature and criticism in the Baptist Theological Seminary at Hamilton, N. Y. He translated (1839) Gesenius' Hebrew Grammar, with the additions of Roediger, which became a standard textbook in English. With Moses Stuart (q.v.), a later translator of Gesenius, he had a long controversy. He was professor of Hebrew and biblical exegesis in Rochester Theological Seminary from 1851 until 1857 and then devoted himself to Bible revision for the American Bible Union until 1875. He published in 1864 a treatise on the term *βαπτίζειν* in the New Testament, which is a classic statement of the philological evidence for immersion. Dr. Conant was one of the American committee on the revision of the Bible. He published critical editions, with revised versions of *The Book of Job* (1856), *The Gospel by Matthew* (1860), *The New Testament* (1866), *The Book of Genesis* (1868), *The Book of Psalms* (1872), *The Book of Proverbs* (1872), *Isaiah i.–xiii.* (1874), and *Historical Books of the Old Testament* (1884).

CONA'TION (Lat. *conatio*, attempt, from *conari*, to attempt). An endeavor, a striving to attain something. The attempt, e.g., to recall a name which has slipped from memory is a conation. There is a difference of opinion among psychologists as to whether conation is an ultimate aspect of consciousness or a complex of sensation (q.v.) and affection (q.v.).

There are two typical cases of conation—the consciousness accompanying muscular exertion, and the state of active attention. (See ATTENTION.) The similiarity of these two experiences has led some psychologists to deny that there is anything more in conation than the strain sensations following upon muscular contraction *plus* a pleasantness or unpleasantness. In attention there are, further, the sensations or ideas attended-to and those attended-from. But it is also maintained, on the other hand, that conation is a simple "attitude" which mind assumes towards its objects, a peculiar "mode of being conscious." It is said to be common to desire, yearning, longing, craving, wishing, and willing; indeed, to all consciousnesses which have an inherent tendency to pass beyond themselves. On this definition conation is a self-determination of consciousness. In desire, e.g., consciousness endeavors to pass from the want of an object to its possession; or, if an unpleasantly toned idea enters consciousness—say the idea of an embarrassing situation—a conation arises, and consciousness makes a forcible effort to eject the unpleasant idea. These two views are not necessarily mutually exclusive, although they arise from two radically different methods of psychology. The first analyzes consciousness without regard to the offices of knowing and willing which mind fulfills, i.e., without reference to the relation of mind to the "outside" world; the second sets consciousness into relation with its objects, and seeks to discover the "behavior" of mind towards the world. Or, in other words, the first scrutinizes the "feeling of effort" or "endeavor" in an analytic way, and finds only sensations of strain and an affective quality; the second assumes that mind takes positive "attitudes" towards its objects—that it is not only a sequence of occurrences, but a self-determining cause, directing its own contents, an agent in much the same sense that friction is an agent in the production of electricity. Consult: Stout, *Analytic Psychology* (London, 1896); Titchener, *Text-Book of Psychology* (New York, 1910); *Experimental Psychology* (ib., 1901); James, *Principles of Psychology* (ib., 1890). See DESIRE; EFFORT; FATIGUE; WILL.

CON'ATY, THOMAS JAMES (1847–1915). An American Roman Catholic prelate. He was born in Ireland and was educated at Montreal College (1863–67), College of the Holy Cross (1869), and Montreal Theological School (1872). He was pastor of the Church of the Sacred Heart, in Worcester, Mass., in 1880–97 and in 1896 was appointed rector of the Catholic University, Washington, with the title of domestic prelate to the Pope (1897). In the autumn of 1901 he was made Bishop of Samos *in partibus*, still retaining his university position. In 1903 he was appointed to the see of Monterey and Los Angeles. In 1893 he organized the Catholic Summer School at Plattsburg, N. Y.

CON'CAN (Skt. *Kōnkana*), or **KONKAN.** A territory in the Presidency of Bombay (q.v.), British India (Map: India, B 5). It is a long strip of country, about 300 miles long by 40 miles broad, running south from the Damanganga River, between the coast of the Arabian Sea and the Western Ghats. Prior to 1818, when it was annexed by the British, it was a Mahratta principality. The modern districts of Thana (pop., 1891, 819,000; 1901, 809,000; 1911, 882,309) and Ratnagiri (pop., 1891, 1,106,000; 1901, 1,167,000; 1911, 1,203,638) are comprised in its area.

CON'CAVE (Lat. *concavus*, hollow, from *com-*, together + *cavus*, hollow; connected with Gk. *κύαρ, kyar*, hole, from *κύειν, kyein*, to conceive, to contain). A surface is said to be concave when its centre of curvature is towards the observer, convex when its centre of curvature is in the opposite direction to the observer. (See LENS, MIRROR.) In geometry a plane polygon is said to be concave if any side produced cuts the polygon. A spherical polygon is said to be concave if any side produced cuts the polygon so as to leave part on one hemisphere and part on the other. A solid is said to be concave if any face produced cuts the solid.

CONCEAL'MENT (from *conceal*, from OF. *conceler*, Lat. *concelare*, to hide, from *com-*, together + *celare*, to hide). As a legal term, the improper suppression or withholding of facts, the covering up of crimes, or the secretion of a person or property. The effect of the concealment of facts is dealt with under such titles as DECEIT; EQUITY; FRAUD; INSURANCE (qq.v.). As an element in criminal offenses, concealment has been considered in the articles on ACCESSORY; BIRTH, CONCEALMENT OF (qq.v.). The concealment of goods which are subject to revenue duty, or the secretion of property for the purpose of preventing its being taken in legal process, and the concealment of a debtor to avoid the service of summons on him, are the sub-

jects of statutory provisions, which should be consulted.

CON'CENTRA'TION CAMPS, or DISTRICTS. In the mobilization schemes of countries whose territories are contiguous, an important feature is of necessity the district within which the mobilized forces concentrate. In the *Field Service Regulations, United States Army, 1913*, a *Concentration Camp* is defined as a place, near the scene of intended operations or near an embarkation point, where troops are assembled for *immediate* use against the enemy or for transport to an oversea theatre of operations. A *mobilization camp* is a place where troops are assembled to be raised to war strength, equipped and prepared for service. (See MOBILIZATION.) The term "concentration camp" was used in a different sense in the Cuban insurrection (1896–98), during which the Spaniards concentrated all Cuban noncombatants within fixed limits; and similarly, in the British-Boer War of 1899–1902, the British collected the women and children of combatants in the field, as well as all noncombatant men, and established them in camps which were popularly known as concentration camps. In 1902 concentration camps were temporarily established by the American military authorities as an incident of the campaign in Mindanao, in the Philippines.

Another example of the concentration camps was found during the internal troubles in Mexico in 1914, when the national forces pursued by revolutionists crossed the Rio Grande and took refuge in the United States. The national soldiers, accompanied by women and children, were received by the United States military forces and collected in concentration camps, where they were disarmed, no opportunity being given for any belligerent action or return to Mexico for hostile purposes.

CONCENTRATION MARCHES. Marches of concentration are made for the purpose of assembling, at a certain time and place, bodies of troops from different localities. Such marches require an accurate computation of the time required for marching and of the road space occupied by the troops. The condition of the roads, weather, etc., must be considered. A column of troops on the march should not be cut by another. If the heads of two columns meet at a distance from the enemy, the senior commander has the right of way; if near the enemy, the senior determines what measures are to be taken. If a column in march overtakes another at a halt, it may pass on, provided its commander be the senior, or the other commander gives his consent. In either case the column which advances first is accompanied by its combat train; the field train waits for the other column with its combat train to pass, but precedes the field train of the latter column. Consult *Field Service Regulations, United States Army, 1913*.

CONCEPCIÓN, kôn-sĕp'sē-ōn' (Sp., conception). The capital of the province of the same name, Chile, situated on the Biobio River, 6 miles from its mouth (Map: Chile, C 11). The streets of the city are clean and paved. The chief buildings are the cathedral, the town hall, the agricultural school, and a normal school. Concepción is a bishopric. A railroad runs to Talcahuano, on the Bay of Concepción, the port of the city. The city is in a fertile district and has an active trade. Pop., 1907, 55,330. Concepción was founded in 1550, on the site of the present Penco, and built in its present situation in 1754, after the destruction of the former town in 1751 by an earthquake. During the Spanish occupation it was the second largest city of Chile. A disastrous earthquake occurred in 1835, after which the city was rebuilt on a more pretentious plan. In 1818 the independence of Chile was declared here.

CONCEPCIÓN, or VILLA CONCEPCIÓN. A city of Paraguay, capital of the department of the same name, on the Paraguay River, 125 miles north by east of Asunción (Map: Paraguay, F 8). Its chief industry is the export trade in *yerba maté*, or Paraguay tea. Pop., 1900, 15,000.

CONCEPCIÓN. A seaport town of Panay, Philippines, in the Province of Iloilo, capital of the District of Concepción, situated on the east coast of the island. It has a good harbor and large sugar manufactories. Pop., 1903, 4565.

CONCEPCIÓN. The largest town of Luzon, Philippines, in the Province of Tarlac, 12 miles south of Tarlac (Map: Luzon, D 5). It has an important sugar industry; rice, tobacco, and corn are also raised in the surrounding country. Pop., 1903, 12,593.

CONCEPCIÓN DEL URUGUAY, kôn-sĕp'sē-ōn' del o͞o'ro͞o-gwä'ē, or **CONCEPCIÓN.** A town in the Province of Entre Rios, Argentina, situated on the Uruguay River (Map: Argentina, F 10). It is the seat of a national college and a normal school. The town has transportation facilities by rail and water, the river being navigable for large vessels, and controls an important trade in cattle and packed meat. Pop., 1895, 6111. Concepción del Uruguay was founded in 1778, by Tomás Rocamora, and was formerly known as Arroyo de la China.

CON'CEPT (Lat. *conceptus*, thought, from *concipere*, to conceive, from *com-*, together + *capere*, to seize). In traditional formal logic a concept is an idea of a characteristic or characteristics belonging to more than one person or thing. Conception stands opposed to "simple apprehension," which deals with individuals singly. But traditional logic has proved unsatisfactory to many philosophers from the time of Kant (q.v.); hence they have taken the term "concept" and changed its meaning to correspond to their views of the function of thought. Thus Kant maintained that the understanding supplies to experience certain forms or principles of connection, such as causality; these he calls "pure concepts," designating the concepts of traditional logic "empirical concepts." For Hegel a concept is the unity which thought in its highest stage achieves, a unity in which contradictories are merged and harmonized. For the pragmatist a concept is a methodological device to which experience resorts when perplexed. "Feeling," says James, "must have been originally self-sufficing; and thought appears as a superadded function, adapting it to a wider environment than that of which brutes take account." Out of the "aboriginal sensible muchness attention carves its objects. We say *what* each part of the sensible continuum is, and all these abstracted whats are concepts." Consult Richter, *The Development of the Concept, Historic and Genetic* (Lancaster, Pa., 1908).

CONCEP'TION. See EMBRYOLOGY, HUMAN.

CONCEPTION, in Psychology. See IDEA.

CONCEPTION, IMMACULATE. See IMMACULATE CONCEPTION.

CONCEPTION OF OUR LADY, SISTERS OF THE. An order of nuns, founded in 1484, in honor of the Immaculate Conception, by Beatrix de Silva, sister of James, first Count of Portalegre, in Portugal. It was confirmed in 1489 by Pope Innocent VIII, who granted the sisterhood permission to follow the rule of the Cistercians; but after the death of the foundress, in 1489, Cardinal Ximenes put the nuns under the direction of the Franciscans and imposed on them the rule of St. Clara. The order subsequently spread into Italy, France, and Belgium. The habit consists of a white gown, a blue mantle, and a scapular on which is worn the image of the Virgin. The Franciscan Sisters of the Immaculate Conception in the United States were established by sisters from Italy in 1891 at Little Falls, Minn. They have two mother houses, conduct four hospitals, an orphanage, a school, and numbered (1913) 74 professed sisters and 13 novices.

CONCEP'TUALISM. A philosophical theory which is in some sense intermediate between mediæval realism and nominalism (qq.v.) and maintains that, while universals have no real existence in the external world, they do exist as ideas or concepts in the mind and are thus something more than mere words. This was Abélard's view. See ABSTRACTION; BERKELEY; LOGIC; IDEA.

CONCERT. (For derivation, see CONCERTO.) A public performance of musical compositions which do not require scenic representation. Before the last quarter of the seventeenth century concerts in the modern sense of the term were unknown. On special occasions musical performances took place at the courts of royalty and the palaces of the nobility, but no admission fee was charged and only invited guests attended. The only opportunity of hearing music performed was offered to the general public in the religious service and the production of oratorios in the churches. The first concerts to which an audience was admitted on payment of a fee were those established by John Banister in 1672 in London. After his death in 1679 Thomas Britton continued the practice. The establishment of the *Concerts spirituels* (q.v.) in Paris in 1725 marks a turning point in the history of the concert. After the model of the French institution numerous organizations devoting themselves to the performance of orchestral works sprang up in Germany, France, and England. Public performances of larger choral works with orchestra date from the foundation of the Berlin Singakademie (q.v.) in 1790. Regular concert tours by celebrated virtuosos were unknown before 1750. Consult: E. Hanslick, *Geschichte des Konzertwesens in Wien* (Vienna, 1869); K. F. Pohl, *Mozart und Haydn in London* (Vienna, 1867); A. Schering, *Geschichte des Instrumentalkonzerts bis auf die Gegenwart* (Leipzig, 1905).

CON'CERTAN'TE, *Ital. pron.* kōn'chĕr-tän'tā (It. p.p. of *concertare*, to perform a concert). An Italian word used to describe an orchestral composition in which two or more instruments or solo voices are in turn given prominent solo parts. See CONCERTO.

CONCERTINA, kŏn'sĕr-tē'nȧ (from It. *concerto*, concert). An hexagonally shaped musical instrument, the sounds of which are produced by free, vibrating tongues of metal, as in the accordion. The scale of the concertina is very complete and extensive, beginning with the lowest note of the violin, g, and ascending chromatically, for three and a half octaves to c^4. There are two tongues for every tone, so that any note can be produced either by pulling the bellows open or by pressing them together. Wheatstone, of London, invented the concertina in 1829. The instrument is capable of a great range of expression, and concertina playing by skilled performers comes rightly under the head of artistic music.

CONCERT MASTER. The leader of the first violins in an orchestra. Through the ever-increasing demands made upon the technique of orchestral players by modern composers the position of concert master has become one of great importance and responsibility. The leader is not only responsible for uniformity of bowing from all the violins and occasional solo parts demanded by the score, but he is generally supposed to take the conductor's place in case of emergency. In large modern orchestras the player at the first desk of each of the groups of strings acts as a secondary concert master for his particular group.

CONCERTO, kŏn-chĕr'tō (Fr. *concert*, from It. *concerto*, concert, from It., Lat. *concertare*, to vie, from *com-*, together + *certare*, to contend; less probably from *conserere*, to join together, from *com-*, together + *serere*, to join). A musical composition for a solo instrument, with orchestral accompaniment, calculated to exploit the resources or possibilities of the instrument and thus to give the performer an opportunity to display the highest technical skill (see CADENZA) as well as intellectual grasp and musical culture. The concerto belongs to the cyclical or sonata (q.v.) group of musical compositions and differs from a symphony or overture only through the special prominence given to the solo instrument. It consists, like the symphony or sonata, of three or four movements, each of which, like the whole, requires a clear development and treatment of motives and a strict adherence to the rules of form. The earliest concertos were written for two or more instruments, being thus really in concertante (q.v.) style. From the beginning of the eighteenth century the pianoforte and the violin have been the solo instruments mostly used for the concerto. Among the oldest violin concertos are those by Tartini and his pupils. The French and Germans afterward improved on these and fixed the forms, which all the great masters of modern times have adhered to. Occasionally concertos are also written for more than one solo instrument, but they do not differ in structure from the usual concerto. The two most famous examples are the triple concerto for piano, violin, and 'cello by Beethoven and the double concerto for violin and 'cello by Brahms. Consult A. Schering, *Geschichte des Instrumentalkonzerts bis auf die Gegenwart* (Leipzig, 1905).

CONCERTO GROSSO. An instrumental form originated by Corelli (q.v.) about the year 1680, employing generally three solo instruments (two violins and one violoncello), with accompaniment of the string orchestra. It really was the precursor of the modern *concerto* (q.v.). The solo instruments, however, were not treated so much individually, rather as a smaller group, complete in itself, against the larger instrumental body. The form was that of the older overture (q.v.) or suite (q.v.). When in the course of the eighteenth century the sonata form (q.v.) obtained a position of predominance among mu-

sical forms, the concerto grosso was gradually displaced by the concerto for one solo instrument with accompaniment of the full orchestra. The double and triple concertos differ from the older concerto grosso inasmuch as the solo instruments are no longer treated as a group, but as so many individual and distinct instruments intended to display the highest skill of the virtuoso. Consult A. Schering, *Geschichte des Instrumentalkonzerts bis auf die Gegenwart* (Leipzig, 1905).

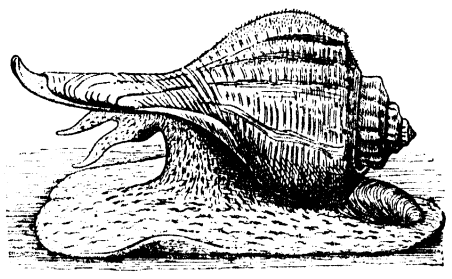
CONCERT PITCH. See PITCH.

CONCERTS DU CONSERVATOIRE, kôn'-sâr' dụ kôn'sĕr'vȧ'twȧr'. The foremost concert institution of Paris, having grown out of the annual pupils' concerts of the conservatory. They were established as symphony concerts of the first rank by Habeneck in 1828. Originally six concerts were given, which gradually were increased to nine. Since 1866 two series are given, each programme being repeated on two successive Sunday afternoons. The orchestra consists of 84 players under Georges Marty (q.v.), who has been the conductor since 1901. Consult A. Dandelot, *La Société des Concerts du Conservatoire de 1828–1897* (Paris, 1897).

CONCERTS SPIRITUELS, spē'rē'tụ-ĕl'. The chief concert institution of France in the eighteenth century. As the opera and all theatres were closed on 24 religious holidays during the year, Philidor (q.v.) in 1725 instituted these concerts. For the first three years all operatic music and works by native French composers were excluded, but after 1728 every form of music by any composer was admitted, and the foremost artists of the time appeared at these concerts. Their reputation and success grew so steadily that they served as models for similar institutions in Germany. The Revolution put an end to these concerts in 1791. Under the old name, but with a different purpose, the concerts spirituels were resumed in 1805. Since then the programmes have been made up exclusively of sacred music and presented only during Holy Week. Consult M. Brenet, *Les concerts en France sous l'ancien régime* (Paris, 1900). See CONCERT.

CONCERTSTÜCK, kôn-tsĕrt'shtụk' (Ger. concert piece). A composition for a solo instrument with orchestra, really a concerto (q.v.) in one movement. While the first movement of a concerto generally is cast strictly in sonata form (q.v.), the concertstück is more free as to form, approaching the form of the fantasia (q.v.). The first movement of Schumann's beautiful concerto for piano and orchestra, op. 54, was originally written as a concertstück.

CONCH, kŏnk (Lat. *concha*, Gk. *κόγχη, konchē*, Skt. *śankha*, shell). The name of many large univalve mollusks. Originally and properly it belongs to the big carnivorous strombs and especially to the great rose-lined stromb (*Strombus gigas*) of the West Indies and Florida Reefs and especially abundant in the Bahamas. Shiploads of these shells are sent to Europe and the United States every year to be ground up for porcelain, burned into lime, calcined for medicinal purposes, or used as ornaments; many are perforated at the apex and serve as dinner horns on Southern plantations. Cameos of an inferior sort are cut in it; and from it are derived, especially in the Bahamas, pink "conch pearls" of value. It is because many of them made an occasional industry of gathering these mollusks and searching for pearls that the poorer sort of people of southern Florida and neighboring islands are called "Conchs." The Indians used the columella of this shell as material for fine beads; and their remains, as



A CONCH (*Sycotypus canaliculatus*).

The attitude is that of creeping towards the left. Beneath the protruding siphon tube two tentacles show the place of the head, the lower one showing the black dot of the eye. On the rear of the expanded foot is the operculum.

well as those of many other large mollusks, abound in the coastal shell heaps. In the East Indies the term is applied often to other large spiral shells, especially those of the closely allied family Tritonidæ. These are often perforated and fitted with mouthpiece and finger holes and so turned into sonorous musical instruments. This is the shell adopted by artists in representations of sea myths—

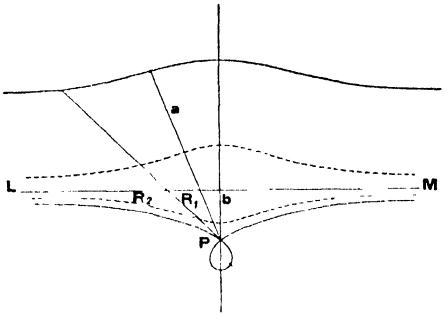
> "Have sight of Proteus rising from the sea,
> Or hear old Triton blow his wreathéd horn."

In the Northern States "conch" means either of two large, pear-shaped univalves of the Atlantic coast, *Fulgur carica* and *Sycotypus canaliculatus*, which frequent the sandy bottoms near shore and are cast up on beaches in great numbers. Both are carnivorous and do great damage to oyster beds. The former, which has a spiral row of short horns defining the whorls, is more common southward, while the latter, distinguished by the squarish channels between the whorls, is nearly confined to the region between Cape Cod and New Jersey. Both are abundant about Long Island and on the southern New England coast, where they are confused under the name "periwinkle" or "winkle." The "sea necklaces," consisting of parchmentlike hollow disks apparently strung upon a long cord, which attract attention on beaches in midsummer, are the egg cases of these mollusks, which have been torn from their attachment to some rock or seaweed and floated ashore. It was from the column of these shells that the Indians made their white wampum. Consult Ingersoll, "Natural History of Economic Mollusks of the United States," in *United States Fish Commission Bulletin for 1889*. See MOLLUSK and the authorities there cited.

CONCHITA, kôn-chē'tȧ. An opera by Zandonai (q.v.), first produced in Milan, Oct. 14, 1911; in the United States, Sept. 28, 1912 (San Francisco).

CONCHOID (kŏn'koid) (Gk. *κογχοειδής, konchoeidēs*, mussel-shaped, from *κογχή, konchē*, shell + *εἶδος, eidos*, form) **OF NIC'OME'DES.** A "shell-shaped" curve invented by Nicomedes (180 B.C.). It is related to the problems of trisecting an angle (see TRISECTION PROBLEM), of constructing two geometric means between two given straight lines, and of duplicating the

cube. The curve may be constructed by drawing a straight line *LM* for the directrix, and through any point *P* as the pole drawing a pencil of lines cutting *LM in* R_1, R_2, ... The conchoid is the locus of points found by laying off a constant length each way from R_1, R_2, . . . on these rays. This constant length is called the "modulus." The curve differs in general shape according as the modulus is equal to, greater than, or less than the distance of the fixed point from the fixed straight line. The figure shows the forms of the curve in the last two cases. The loop occurs when the modulus is greater



than the perpendicular distance from *P* to *LM*. When the modulus equals this distance, *P* is a cusp on the curve. The directrix *LM* is an asymptote to the two branches of the curve. If the foot of the perpendicular from the pole to the directrix is taken as the origin, and the distance is called *b*, and the modulus *a*, the equation of the conchoid is $(y + b)^2 (a^2 - y^2) - x^2y^2 = 0$. Its order is the fourth, and its class the sixth unless *P* is a cusp, in which case its class is the fifth. (See CURVE.) *P* is, in general, a double point, and the curve meets its asymptote at four consecutive points at infinity. The curve may easily be described mechanically, and is frequently used in architecture as a bounding line of the vertical section of columns. Consult Klein, *Vortrage uber ausgewählte Fragen der Elementargeometrie* (Leipzig, 1895), trans. as *Famous Problems of Geometry* (Boston, 1897), and any work on analytic geometry.

CONCHOLOGY, kŏn-kŏl'ō-jĭ. See MOLLUSCA.

CONCHOS, kŏn'chōs, RIO (connected with Sp., Lat. *concha*, shell). A river in Mexico, in the State of Chihuahua, rising on the southern border of the east of the Sierra Madre, flowing in a northerly direction through the table-land of that region, and joining the Rio Grande del Norte at Presidio del Norte after a course of about 350 miles (Map: Mexico, G 3). It receives a number of confluents from the west, but no important tributary from the east.

CONCIERGE, kôn'syârzh' (Fr., doorkeeper). The French title of the janitor of an apartment house. He is an important functionary in the life of most French, German, and the largest Russian cities. He sits in his little office by the main entrance and exercises a certain supervision over all who pass in or out, opening the door to those who enter after a certain hour of the night (in Vienna as early as 10 o'clock).

CONCIERGERIE, kôn'syâr'zh'rē', LA. A Paris prison, famous as the place of confinement of political prisoners during the French Revolution. It forms a part of the Palais de Justice towards the river and was originally the residence of the concierge of the old palace. Among the famous prisoners confined in the Conciergerie and taken thence to the guillotine were Malesherbes, Madame Roland, Danton, Desmoulins, and Robespierre. Here Marie Antoinette was confined before her execution, in a small cell, afterward changed into a chapel. In 1840 Napoleon III was for a time an inmate of the prison.

CONCILIUM. See COMITIA.

CONCINI, kôn-chē'nē, CONCINO. A favorite of Marie de' Medici of France. See ANCRE.

CON'CLAVE (Fr., Sp., Portug., It., Lat., room which may be locked, from *com-*, together + *clavis*, key, Gk. κλείς, *kleis*, key, from κλεῖν, *klein*, to shut). Either the place where the cardinals assemble for the choice of a pope, or the assembly itself. In 1179 a Lateran Council decreed in its first canon that a two-thirds vote of the cardinals was essential for a choice. This decree was developed, and the regulations, which are substantially still in force, established by Gregory X at the Council of Lyons in 1274. These rules are intended to provide against unnecessary delay or precipitation in election and against any external interference with absolute freedom of choice. A part of the Vatican is devoted to this use and is divided into a number of small apartments. Only one door is open, and that is under the strict supervision of officials designated for the purpose. Since 1848 food is prepared in the conclave, and the cardinals are not allowed to leave the place, or to receive or send out letters, until a new pope is chosen. Though directive legislation has varied from time to time, the present form may be said to have been fixed in its essential features since the end of the thirteenth century. When a pope dies, the College of Cardinals possesses supreme authority. Cardinals only may vote, but non-cardinals are not excluded from candidature. All are sworn to secrecy. No voting by proxy is allowed. As to place, there is hardly any restriction. Formerly each cardinal in the name of the Catholic country which he represented had the right of excluding a candidate not acceptable to his government. This privilege he could exercise only once during the election. It it not possible to determine how old this concession was. Pius X prohibited, Jan. 20, 1904, under pain of excommunication, any elector to receive in any guise whatever a proposed veto against any possible nominee. The cardinals take an oath to this effect. A two-thirds vote is necessary to elect. Consult: any authorized manual on canon law; Wernz, *Jus Decret* (Rome, 1899); Thurston, "Conclaves, Past and Present," *Month*, vol. cii (London); *La Revue des Deux Mondes* (March 15, 1904). See POPE.

CONCOM'ITANCE (ML. *concomitancia*, from Lat. *concomitari*, to accompany, from *com-*, together + *comitari*, to accompany, from *comes*, companion), SACRAMENTAL. In the Roman Catholic church, a term which implies that the body and blood of Christ sacramentally accompany each other, so that under either form, whether wine or bread, both are sacramentally received. Hence the laity in that communion, although they are not permitted to take the cup, still are held to receive Christ's body and blood. See COMMUNION IN BOTH KINDS.

CONCOM'ITANT VARIATION, METHOD OF. See INDUCTION.

CONCONE, kôn-kō'nā, GIUSEPPE (1810–61). An Italian vocal teacher, born in Turin. He is widely known for his vocal exercises—solfeggi

and vocalizzi—which are unusually attractive for works of their kind and at the same time excellent for their special purpose. For about 10 years Concone resided in Paris as a teacher. Returning to Turin in 1848, he was at the time of his death organist and choir master of the court choir.

CONCORD, kŏn'kērd. A town in Middlesex Co., Mass., 20 miles by rail northwest of Boston; on the Concord and Sudbury rivers, and on the Boston and Maine Railroad (Map: Massachusetts, E 3). It has manufactures of rubber goods, chairs, woolens, and harness. The town contains the Massachusetts Reformatory, a fine public library, the old North Bridge, and many other places of historic interest. The government is administered by town meetings, and the municipality owns and operates its water works and electric light plant. Pop., 1900, 5652; 1910, 6421.

Concord, settled in 1635, is the oldest interior town in Massachusetts and by the time of the Revolution had come to be one of the great centres, not only of intellectual life, but also of political influence and power. In August, 1774, the Middlesex Convention, the first county convention assembled in Massachusetts, was held here, every town being represented; and on October 11, under the stimulus of the Revolutionary agitation, the first Provincial Congress, presided over by John Hancock, met at Concord to consider the question of resisting the tyrannies of George III. Later large quantities of ammunition and military supplies were stored here, and in an attempt made by the British to destroy them, on April 19, 1775, occurred the memorable fight which precipitated the War of the Revolution. (See LEXINGTON.) In 1787, during Shays's Rebellion, a body of insurgents entered Concord and prevented the sitting of its courts. The town is chiefly notable for having been the home of a distinguished coterie of writers and thinkers, including Emerson, Thoreau, A. Bronson Alcott, Louisa M. Alcott, Hawthorne, and William Ellery Channing, "the poet." Consult Hurd, *History of Middlesex County* (Philadelphia, 1890), and Emerson, *Historical Discourse Delivered in 1835* (Concord, 1835).

CONCORD. A city, capital of New Hampshire, and the county seat of Merrimack County, 75 miles by rail north-northwest of Boston; on the Merrimac River and on the Boston and Maine Railroad (Map: New Hampshire, G 7). It has wide streets, shaded and well paved, and a good water supply, owned and operated by the municipality. Among the principal buildings are the State House, built of granite, United States Government building, courthouse, and city hall, State prison, State Hospital for the Insane, the Margaret Pillsbury Hospital, Odd Fellows' Home, State Historical Society, Home for the Aged, Orphans' Home, State library, and St. Paul's School (Episcopal) for boys. There are several parks: White's, Rollins, Fiske, Contoocook River, and Penacook. In the State-House park are statues of Daniel Webster, John Stark, and John P. Hale, and at Penacook a monument to Hannah Dustin. In the vicinity are extensive quarries of fine-grained white granite, the quarrying of which is one of the leading industries. The car shops of the Boston and Maine Railroad are situated here. The manufactures include carriages, silverware, harness, furniture, flour, cotton and woolen goods, leather belting and leather hose, pianos, shoes, etc. Under the charter of 1909 Concord is governed by a mayor, chosen every two years, six aldermen at large, elected for four years, three assessors, and nine ward aldermen, chosen for two years. The mayor and aldermen at large constitute a board of public works, which has extensive powers. The police and fire departments, each with a chief, are controlled by the board of aldermen. The water works are managed by a board appointed by the mayor. The school board is chosen by popular election. Pop., 1900, 19,632; 1910, 21,497.

Concord was founded in 1725, on the site of Penacook, the chief village of the Penacook Indians, and bore that name until 1733, when it was incorporated as Rumford. It suffered greatly in all the Indian wars and was the scene of a massacre in 1746. In 1765 Rumford was renamed "Concord." On the adoption of a State constitution it became the capital of New Hampshire and in 1853 was incorporated as a city. Consult: Moore, *Annals of Concord, N. H.* (Concord, 1824); Bouton, *The History of Concord* (ib., 1856); City History Commissions, *History of Concord* (ib., 1903).

CONCORD. A city and the county seat of Cabarrus Co., N. C., 21 miles northeast of Charlotte, on the Southern Railroad (Map: North Carolina, B 2). It is the seat of the Jackson Training School and the Scotia Seminary. There are foundries and machine shops, and extensive manufactures of cotton. First incorporated in 1793, Concord is governed at present under a charter of 1851, revised in 1891, which provides for a mayor, elected biennially, and a city council. The water works and electric light plant are owned by the city. Pop., 1890, 4339; 1900, 7910; 1910, 8715.

CON'CORD, IN MUSIC. See CONSONANCE.

CONCORD, BOOK OF (trans. of Ger. *Concordienbuch*, Lat. *Liber Concordiæ*). A collection of confessions of faith published in 1580, generally accepted by the Lutheran church. Its contents are: (A) The three ecumenical creeds —the Apostles', the Nicene, and the Athanasian. (B) The six particular confessions of the Lutheran church—(1) the Augsburg Confession; (2) the Apology of the Augsburg Confession; (3) the Schmalkald Articles; (4 and 5) the Larger and Smaller Catechisms of Luther; (6) the Formula of Concord. The last-named division, the Formula of Concord, appeared in 1580, after protracted conferences, and was acceded to by 86 of the states of the German Empire, but rejected by some of the states and by Bremen and Frankfort among the free cities. Its topics are: The Rule of Faith and the Creed; Original Sin; Free Will; Justification; Good Works; The Law and the Gospel; The Third Use of the Law; The Lord's Supper; The Person of Christ; The Descent of Christ into Hell; The Customs of the Church; Predestination and Election; and an appendix concerning heresies and sectaries. The best editions are: in German, Jubilee edition (St. Louis, 1880); in Latin, that of S. F. Francke (Leipzig, 1847); in English, that of H. E. Jacobs (Philadelphia, 1882). Consult Schaff, *Creeds of Christendom*, vols. i and iii (New York, 1878); Curtis, *History of Creeds and Confessions* (Edinburgh, 1911).

CONCORD, TEMPLE OF (so called). A Doric temple at Girgenti, the ancient Agrigentum, in Sicily, and one of the most perfectly preserved of ancient temples. Its 34 columns are still standing.

CONCOR'DANCE (ML. *concordantia*, agreement, from Lat. *concordere*, to agree, from *com-*, together + *cor*, heart). A book arranged in alphabetical order and showing in what passages all, or at least all of the more important, words in any work occur. For writings of universal import from which passages are continually being adduced to prove or support principles affecting our daily life and action, such a handbook is indispensable. The necessity for such a book upon the Bible was doubtless early felt, but tradition assigns the first Bible concordance to the famous St. Anthony of Padua (q.v.). It was entitled *Concordantiæ Morales in Sacra Biblia* (best ed., De la Haye, Paris, 1641), and was published early in the thirteenth century. In 1244 Cardinal Hugo de Saint-Cher published his *Concordantiæ Jacobi*, so called because made in the convent of St. James in Paris. Both these works were of course based on the Vulgate, as were several similar ones before the invention of printing. The earliest printed concordance to the Vulgate is by Joannes de Segovia and Sebastian Brant (Basel, 1496), and it is the basis of that published and edited by Robert Stephens (Paris, 1555). A concordance to the Greek Bible (Old and New Testament) was made by Euthalius of Rhodes about 1300; it has never been printed, but a manuscript copy was seen in Rome in the seventeenth century. One to the Septuagint was compiled by Conrad Kircher (Frankfort, 1607), and to the Greek New Testament by Xystus Betuleius (Basel, 1546), which, as amended by Robert Stephens and his son Henry, was published by the latter (Paris, 1594). Rabbi Isaac Nathan finished in 1448 a concordance to the Hebrew Bible (Venice, 1523), which in amended form by Marius de Calaris was published (Rome, 1621–22); another was begun by the elder and finished by the younger Johann Buxtorf (Basel, 1632). The first work of this kind in English was a concordance to the New Testament printed and in all probability prepared by Thomas Gibson (London, 1535); but the first concordance to the entire English Bible was by John Marbeck (London, 1550). Luther's German Bible had to wait till 1610 before a concordance to it appeared at Frankfort. The author was Conrad Agricola.

But all these works are now superseded by the vastly better modern works. For the Hebrew Bible the standard concordance is that by Julius Fürst and Franz Delitzsch, in Latin (Leipzig, 1837–41); but just as good for all practical purposes will be found *The Englishman's Concordance to the Hebrew Old Testament* (London, 1843; 4th ed., 1873), compiled by Tregelles, B. Davidson, and others. For the Septuagint, the best is by Hatch and Redpath (London, 1892–97); for the Vulgate, two recent works are by V. Coornaert (Bruges, 1892), and by Peultier, Etienne, and Gantois (Paris, 1902). To the Greek New Testament the best concordance in Latin is by C. H. Bruder (Leipzig, 1842; 5th ed., Göttingen, 1900); in English by W. F. Moulton and A. S. Geden (London and New York, 1897). To Luther's Bible the standard is M. G. Büchner's (Jena, 1740; 23d ed., Berlin, 1899). To the Authorized Version of the English Bible Alexander Cruden was the first to prepare a concordance which met with wide acceptance (London, 1737), and it has been reprinted so often, complete or in condensation, that Cruden has become a household word. Three others, however, are excellent—Robert Young, *Analytical Concordance to the Bible* (Edinburgh, 1879), often reprinted, Walker, *Comprehensive Concordance* (Boston, 1894), and James Strong, *The Exhaustive Concordance* (New York, 1894), which takes account of every word and is surely the most ambitious work of its kind.

Other books than the Bible have been furnished with concordances by the patient and long-continued labors of scholars. To enumerate a few: *Dante*, E. A. Fay (Boston, 1889); *Omar Khayyam* (Fitzgerald's), J. R. Futtin (London, 1899); *Chaucer*, the Chaucer Society (begun London, 1872); *Shakespeare*, Mrs. Mary Cowden Clarke (London, 1845), or, better, John Bartlett (New York, 1894); Milton, *Poetical Works*, G. L. Prendergast (Madras, 1857); C. D. Cleveland (London, 1867); *Pope*, E. Abbott (ib., 1875); Cowper, *Poetical Works*, J. Neve (ib., 1887); *Gray*, Albert S. Cook (ib., 1909); *Burns*, J. R. Reid (Glasgow, 1889); *Wordsworth*, Lane Cooper (London, 1911); *Shelley*, F. S. Ellis, (ib., 1892); *Dickens*, G. A. Pierce (ib., 1898), and M. Williams (ib., 1907); *Tennyson*, D. R. Brightwell (ib., 1869), and A. E. Baker (Taunton, 1911); *Browning* (*a Phrase Book*), Marie A. Molineux (New York, 1896).

CONCOR'DAT (Fr., agreement). A term used to designate a compact dealing with ecclesiastical affairs between the Pope, as head of the Roman Catholic church, and the temporal ruler of a state. Concordats commonly relate to things which are neither purely spiritual nor purely temporal, but mixed matters, in regard to which the action of the two powers can with difficulty be dissociated. Concordats may be framed either in the form of a treaty, to which both the contracting powers are consenting parties, or enacted by proclamation issued only by one party, most commonly by the Pope, embodying in the form of a decree the regulations resulting from the terms of agreement previously arrived at. The difference is only in form. It is a settled doctrine of Roman Catholic canonists, and especially of those of the Ultramontane (q.v.) school, that the Pope never absolutely cedes purely spiritual powers. Thus, in the presentation to bishoprics, while the King "nominated" or "elected," the Pope always reserved to himself the power of "canonical institution." There have been many famous concordats, of which the following are the most important: 1. *Concordats with Germany.*—The well-known Concordat of Worms in 1122, respecting investitures, is commonly regarded as the first concordat strictly so called. Similar agreements took place on the question of the *Regalia* (q.v.), between the Roman see and the emperors Otho IV, Frederick II, and Rudolph of Hapsburg. A more comprehensive compact on Church matters is that of which the foundation was laid at Constance in 1418, and which was subsequently modified by the "Frankfort" or "Princes' Concordat," by the Concordat of Aschaffenburg, and by that of Vienna, which last, although practically disregarded by Joseph II and his successor, Leopold II, continued in use till the dissolution of the Holy Roman Empire in 1806. Its place was supplied, under Pius VII and his immediate successors, by separate concordats with Bavaria, 1817; Prussia, 1821; Baden, Württemberg, and other minor states, 1818; Hanover, 1824; and Saxony, 1827. The last German concordat was that concluded at Vienna, Aug. 18, 1855. This provided for the fullest papal authority in the Austrian domin-

ions. The Church was to control education and to exercise a censorship over the press. The ecclesiastical courts were accorded special privileges. The Emperor was to nominate bishops, but only with the advice of the existing bishops and archbishops. The Church might acquire new property, but once acquired, it could not be sold or mortgaged without the consent of both Pope and Emperor. This concordat, so favorable to the papacy, was set aside in 1868 in all the dominions of the Emperor of Austria. 2. *With France.*—The Pragmatic Sanction, ascribed to St. Louis, but really of later date, has some of the characteristics of a concordat; but the first proper concordat is that of Bologna, concluded by Francis I with Leo X in 1515 and 1516, which continued in force, although with more than one conflict of the two powers, till the Revolution. In reëstablishing the Church in France, Napoleon Bonaparte, as First Consul, concluded with Pius VII the celebrated Concordat of 1801, which he afterward compelled the Pope, then a captive at Fontainebleau, to modify by a new act in 1814. Both were ignored at the Restoration; but an attempt to produce a substitute in 1817, and again in 1819, led to no result. 3. *With Italy.*—In Italy an agreement regulating the election of bishops was concluded with Nice and Savoy by Nicholas V in 1415; and a formal concordat was made with Sardinia by Benedict XIV in 1740. The ecclesiastical affairs of Naples were anciently regulated by the terms of what was called the *Monarchia Sicula;* but a formal concordat was made by Pius VII in 1818. 4. *With Spain.*—Charles I concluded a concordat for his Spanish kingdom with Adrian VI and Clement VII; and a further concordat was made by Clement XII and Philip V in 1737. 5. *With Portugal.*—Benedict XIV made a concordat with Portugal in 1741 and again in 1886. Besides these, the papacy has from time to time made many similar concordats with various small powers, especially with South American states in the nineteenth century. The age of concordats has passed away with the establishment of the preponderance of the state over the church, and for the most part concordats have been abrogated, such as that with France and with Austria. But several of the concordats still remain in force, as, e.g., that with Spain and with Bavaria.

Consult: Séché, *Les origines du Concordat* (Paris, 1894); Cardinal Cavagnis, *Institutiones Juris Publici Ecclesiastici* (Rome, 1906). The texts of the various concordats will be found in the collections of Münch (Leipzig, 1830); Nussi (Mainz, 1870); Walter (Bonn, 1862); Balve (Munich, 1863); often with extensive commentaries. See AUSTRIA-HUNGARY; CONSTANCE, COUNCIL OF; GERMANY; HOLY ROMAN EMPIRE; INVESTITURE; NAPOLEON I; PIUS VII.

CONCORDE, kôn'kôrd', PLACE DE LA (Fr., Square of Concord). The largest square in Paris, the starting point of the Champs Elysées, bounded by the Rue de Rivoli, the Tuileries Gardens, and the Seine. It is associated with many historical occurrences. On it, on May 30, 1770, occurred a panic caused by fireworks, resulting in the death or injury of over 3000 persons. On the spot now occupied by the obelisk stood the guillotine by which more than 2800 persons died between Jan. 21, 1793, and May 3, 1795. In 1871 the Versailles troops engaged in a fierce struggle with the Communists on the square. The present name of the place, previously the Place Louis XV, was given in 1799. It was again called Place Louis XV from 1824 to 1830, when the name now in use was restored. Architecturally the square is one of the finest in the world. It is adorned with an obelisk from Luxor, presented by Mehemet Ali in 1831, with striking fountains, and eight figures representing the principal towns of France, and at night is brilliantly illuminated by 20 large bronze clustres of lamps. It commands a fine view of the Champs Elysées with the Arc de Triomphe, of the Madeleine, and of the Chambre des Députés, approached by the Pont de la Concorde.

CONCORDIA, kôn-kôr'dê-à. A river port in the Province of Entre Rios, Argentina, situated on the right bank of the Uruguay (Map: Argentina, F 10). It has oil mills and slaughterhouses and exports large quantities of salt meat, leather, and Paraguay tea. Pop., 1895, 12,694.

CONCORDIA, kŏn-kôr'dĭ-à. A city and the county seat of Cloud Co., Kans., 202 miles west-northwest of Kansas City, on the Missouri Pacific, the Union Pacific, the Atchison, Topeka, and Santa Fe, and the Chicago, Burlington, and Quincy railroads, and on the Republican River (Map: Kansas, E 3). The city contains Nazareth Academy, St. Aloysius' School, St. Joseph's Hospital, and a Carnegie library. Concordia has abundant water power, is in a fertile agricultural country, and has valuable deposits of coal and building stone. There are grain elevators, flouring mills, a cold storage and ice plant, creameries, produce-packing plants, plow and wagon works, brick and cement-block plants, etc. The water works are owned by the municipality. Pop., 1910, 4415.

CONCORDIA (Lat., from *con-*, together + *cor*, heart). A Roman divinity, the goddess of harmony. Many temples were built in her honor, the oldest of them by Camillus in 367 B.C., after the passing of the Licinian Laws. (See AGRARIAN LAW.) It stood in the Forum between the Temple of Saturn and the Mamertine Prison, at the foot of the Capitoline Hill, and was built of white marble with a richly carved cornice. Within the temple were many masterpieces of Greek sculpture. It contained, besides, paintings and a collection of precious stones. It was twice rebuilt, in 121 B.C. and under Augustus, but only scanty ruins now remain. The temple sometimes served as a meeting place for the Senate, and Cicero there delivered his last oration against Catiline. The goddess was represented as a matron, holding in her right hand a saucerlike vessel (*patera*) or an olive branch, and in her left the horn of plenty. Her symbols were two hands clasped together, and two serpents entwined about a wand. On the worship of such abstract conception as deities, consult Fowler, *Roman Festivals* (London, 1899). For the temple, consult Hülsen-Carter, *The Roman Forum* (Rome, 1906).

CONCRES'CENCE (Lat. *concrescentia*, growing together, from *concrescere*, to grow together, from *com-*, together + *crescere*, to grow; connected with Lat. *creare*, to create). The growing together of young plant organs by reason of mutual contact or pressure when forming. The term has also been applied to the apparent union of neighboring organs, such as the flower parts. In these cases, however, each organ begins its development independently, and those which appear to be united are lifted by the growth, underneath the separate rudiments, of a

region of tissue which belongs equally to all. See TERATOLOGY; FLOWER.

CONCRETE'. An artificial stone made of gravel, broken stone, or other inert material, sand, and cement, which when mixed with water soon set into a hard, dense mass. It is of very remote origin, specimens having been found in the earliest structures. In ancient Rome it attained a high degree of use, particularly in the walls of buildings, many of which are now in existence. While fundamentally any cementitious material may be used in its manufacture, the term is now exclusively applied to the artificial stone in which the binder is a hydraulic cement, i.e., one that will set under water. (See CEMENT.) Its particular advantages are its cheapness and availability as compared to stone masonry and the ease with which it may be cast into any shape or form, due to its plastic nature during manufacture. Of late years its use has greatly increased because of the invention of reinforced concrete, i.e., concrete in which steel is imbedded to supplement certain strength deficiencies in the concrete itself. In the year 1913, in the United States alone, over 80,000,000 barrels of cement were used in the manufacture of concrete.

As it closely approximates the natural stone in appearance and strength, and as it is much cheaper than any but the cheaper grades of stone, concrete is used in all classes of masonry structures, such as foundations, dams, walls, arch bridges, breakwaters, piers, pavements, reservoirs, locks, docks, etc. In under-water work it is much more widely used than natural stone because of the much greater ease in placing. Reinforced concrete can be made into much lighter forms of construction and is thus available for practically all classes of work in which timber, stone, or structural steel is used.

Constituents. The component parts of concrete are water, cement, and stone of varying size, the latter known as the *aggregate* and divided into fine and coarse aggregate. Since the comparatively recent development of Portland cement, it has been practically exclusively used for concrete, natural cement being used only in mortars and in concrete where strength or quality is not the prime requirement. In Europe and in rare instances in the United States a pozzuolanic cement is sometimes used for special work. Portland cement is now manufactured under a universally adopted specification and is of a uniformly high grade. It is invariably tested at the mill, but it is the custom for the purchaser to make his own tests on all large and important work. It is delivered to the work in cloth or paper sacks holding 0.95 cubic feet (98 pounds), more rarely nowadays in barrels holding 3.8 cubic feet (391 pounds), or still more rarely in bulk in car-load lots. The fine aggregate is generally a natural sand, though sometimes a crushed stone, reduced to sand size, is used. Sand must be clean and free from impurities and should pass certain tests as to its fitness for concrete material. The coarse aggregate may be any inert material, but is generally crushed rock or gravel, although broken brick, shards, cinders, and slag have been successfully used. It must be as hard, dense, and stable as possible and should break into round rather than flat pieces. The water must be clean and free from impurities.

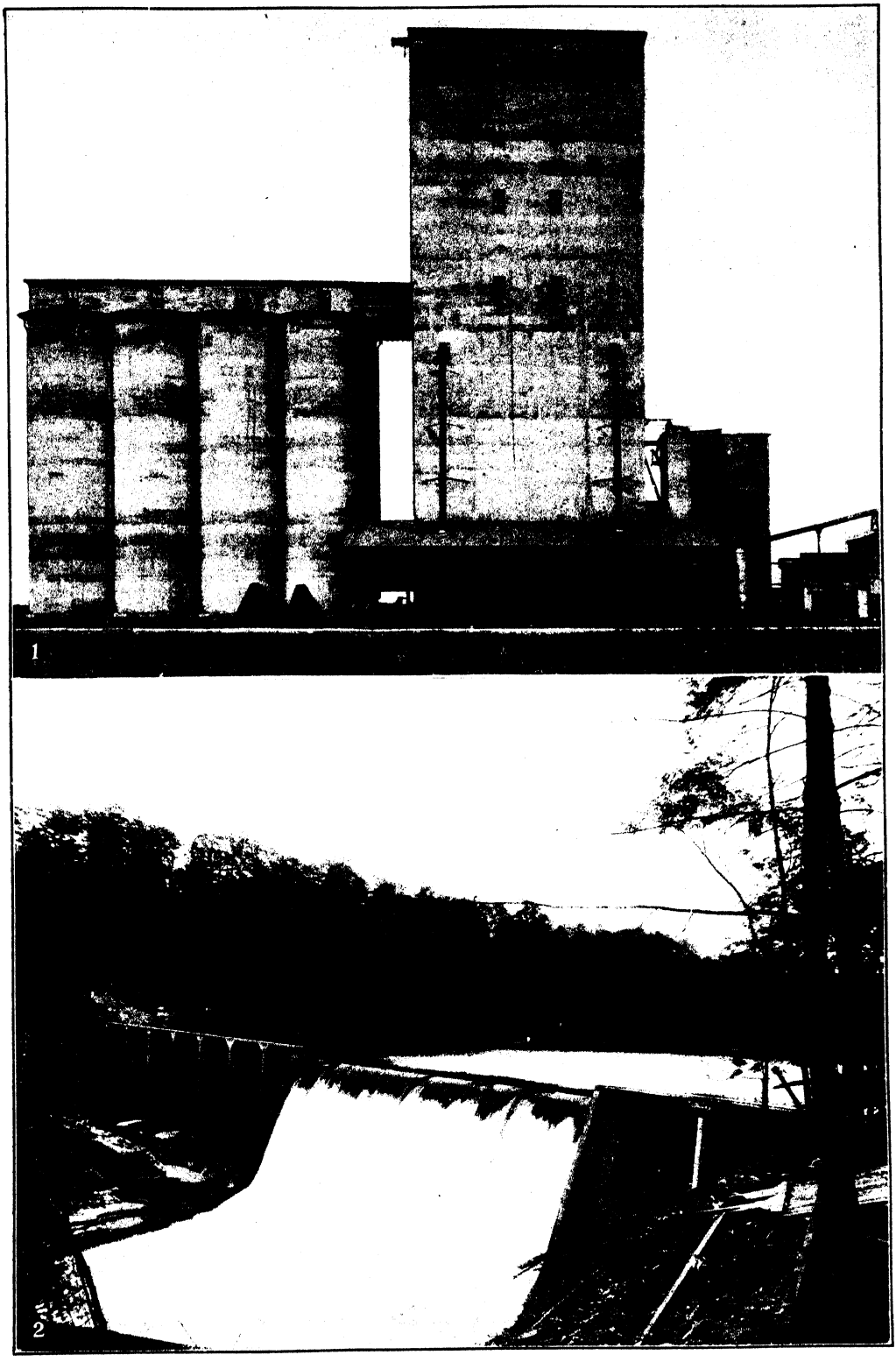
The strength of concrete depends largely on its density, and that in turn depends upon the gradation of the sizes of the various elements that make it up. A theoretically perfect concrete is one in which the cement completely surrounds the sand, making a mortar which completely fills the voids in the stone. This ideal condition results when there is such a gradation in sizes that all the voids in one class of material are filled with the particles of the next smaller material. The sizes of the particles of the various elements follows: cement, less than 0.005 inch; sand, ⅛–¼ inch; stone, ¾–3 inches. In one class of concrete, known as rubble or cyclopean concrete, large stones, even up to derrick size, are used. These are only for heavy mass work and are dumped into the wet concrete before it is set, care being taken that each stone has at least a 1-inch coating of mortar.

In high-class work great effort is made to analyze and grade the aggregate so that the ideal progression of sizes is achieved, but in general practice the best that can be done is to select as well-graded material as is commercially possible and then to proportion the material to give the densest concrete. These proportions vary from one part cement, one part sand, and two parts stone, all by volume (known as a 1 : 1 : 2 mixture), to one part cement, three parts sand, and seven parts stone (a 1 : 3 : 7 mixture), the strength increasing with the amount of cement. The most generally used mixes are a 1 : 2 : 4 for reinforced-concrete work and a 1 : 3 : 5 for mass concrete. The amount of water to be used varies with the material, the temperature, and the humidity, but is generally from 16 to 25 per cent by volume. A greater proportion is sometimes used to make easier working, but it tends to reduce the initial strength of the concrete.

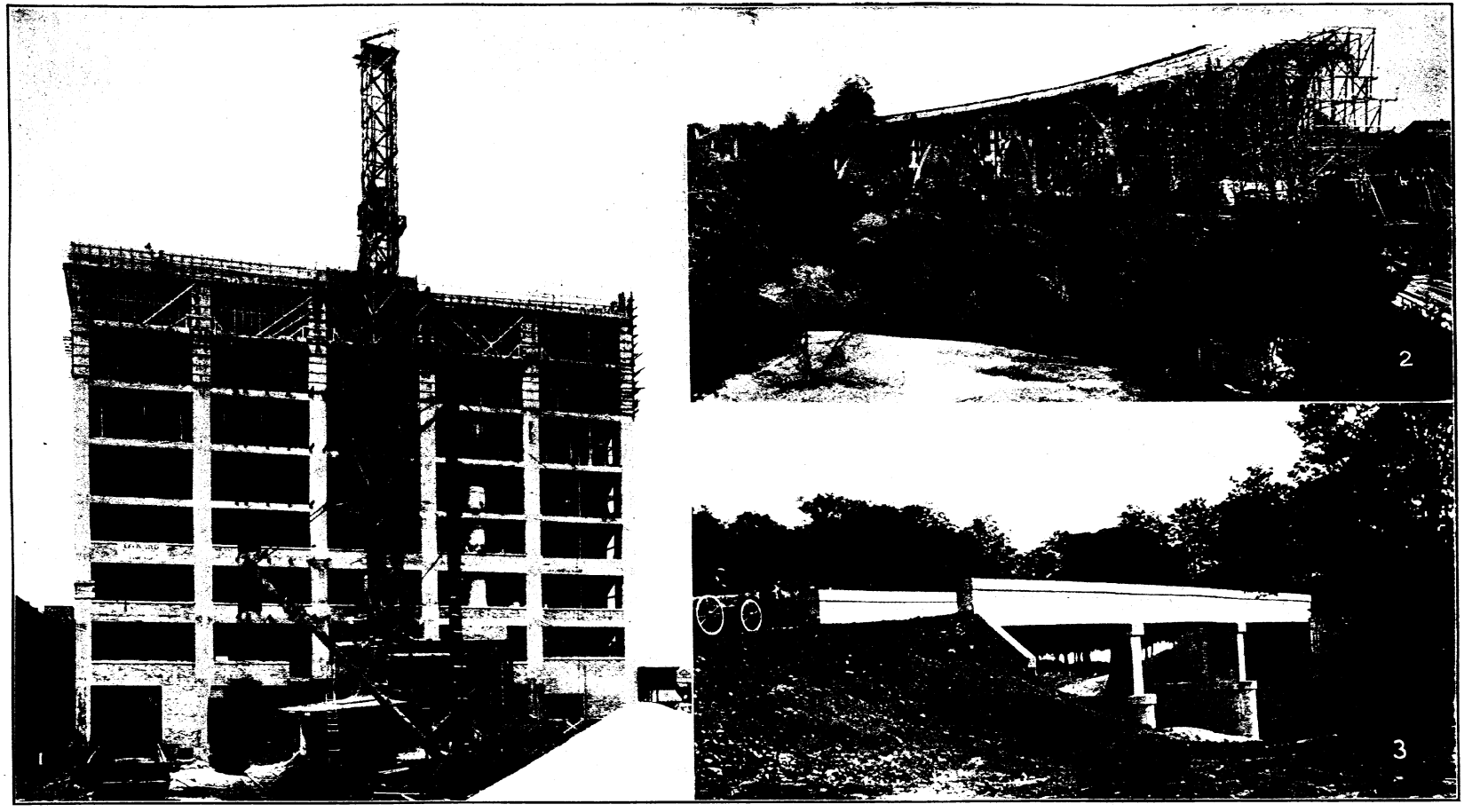
Manufacture. The manufacture of concrete is generally a field operation, though sometimes separate units are shop cast, as noted below. It is mixed wet and placed in the forms which give it its desired shape; after it sets into a hard stone, the forms are removed. Formerly only hand mixing was the rule, the various ingredients being thrown on a board and turned and mixed by spading until they were thoroughly combined. Now the machine mixer is almost universal, and hand mixing is resorted to only in small work.

Machine mixers are power-driven devices which turn and stir the ingredients until they may be delivered in a thoroughly mixed condition. They are of two general types, the continuous mixer and the batch mixer. The former takes the sand, cement, and stone, with water, at one end and delivers the concrete from the other end in a continuous stream. Their general design is a trough in which a screw paddle works the material together and through the trough. The batch mixer, as its name implies, takes a definite amount of the materials and mixes and delivers the concrete batch before taking another batch. Its general type is a drum (cubical, doubly conical, or cylindrical), mounted on a horizontal axle on which it revolves. It is provided with interior baffles or blades which assist the mixing process. A third type of mixer, which has recently come into the market, mixes the concrete by the force of compressed air in an air-tight drum into which the ingredients are placed.

Placing. The concrete is taken from the mixer and placed in the work by wheelbarrows,



1. A REINFORCED-CONCRETE GRAIN ELEVATOR AT CHICAGO, ILLINOIS
2. A REINFORCED CONCRETE HOLLOW DAM AT CUYAHOGA FALLS, OHIO



1. A REINFORCED-CONCRETE BUILDING UNDER CONSTRUCTION AT CHICAGO, ILL. Method of building is shown; new **concrete** in upper floors being supported by **struts**, which are removed in lower floors where concrete has hardened. Note tower for placing of concrete
2. A REINFORCED-CONCRETE ARCH BRIDGE IN COURSE OF ERECTION AT PASADENA, CALIFORNIA
3. A REINFORCED-CONCRETE GIRDER BRIDGE. Woodland Bridge, Watseka, Ill.

locomotive-drawn cars, derricks and buckets, cableways and buckets, chutes or belt conveyors, the particular method depending upon the size of the work and the local conditions. In underwater work it is placed through long tubes, called "tremies," which reach from above the water to the place where the concrete is being laid, or by bottom-dumping buckets, which are not opened until the concrete is reached. It cannot be deposited through open water because the various ingredients would separate before reaching the proposed place of deposition.

Forms. One of the most important features of concrete work is the design and construction of the molds, technically called "forms," in which the concrete is laid. These must be of the proper shape and size to give the required finish, must be strong enough to withstand the hydraulic pressure of the wet concrete, and finally must be so arranged as to be easily taken down and used, for the sake of economy, in other work. Generally they are of wood, but in extensive work steel forms are sometimes used.

Strength. Concrete, like natural stone, is very strong in compression and weak in tension, so that, unaided by any other material, it is of value only to carry direct loads. Its strength, then, is measured by its compression resistance. This resistance increases with the proportion of cement in the mixture and with the age of the concrete. When first made, concrete is a semiliquid mass of no strength, and it reaches an initial set in the course of a few hours and a definite resistive quality in about 24 hours. Thereafter its usual increase in strength is in the following ratio, assuming a 100 per cent strength in 2 years: 7 days, 50 per cent; 1 month, 67 per cent; 6 months, 90 per cent; 1 year, 98 per cent; 2 years, 100 per cent. Some tests have been made over longer periods than two years, and although they are not conclusive as to further increase in strength, it is generally assumed that there is no retrogression after that period. The accompanying tables give some average values for the compression strength of different mixtures of good concrete for one month and six months:

COMPRESSIVE STRENGTH OF CONCRETE IN POUNDS PER SQUARE INCH

MIXTURE	AGE	
	30 days	6 mo.
1:1½:3	2500	3800
1:2 :4	2000	3000
1:2½:5	1800	2600
1:3 :6	1600	2400
1:4 :8	1100	1700

The strength of concrete varies also with the kind of materials used, poor cements, weak stone, dirty sand, and impure water materially reducing its resistive quality. The set is always retarded by freezing; below 40° F. the setting is very slow, but proceeds until freezing, when the setting process practically ceases. A concrete which is frozen before setting will resume the setting process after thawing out. In order to avoid trouble in winter work good practice demands that the water and aggregate be thoroughly heated before being placed in the forms and, in extremely low temperature, the inside of the forms be artificially heated until the concrete has set. By taking such precautions concrete has been successfully laid in temperatures as low as 30° F. below zero.

Reinforced Concrete. Reinforced concrete (known in Europe as concrete steel, armored concrete, béton ferré, béton armé, etc.) is concrete in which steel has been placed to supplement the strength deficiencies of the concrete. Its initial use was about 1860, but it is only since about 1900 that it has been generally employed. Now it is one of the most popular structural materials.

The action of the reinforcing steel in reinforced concrete may be explained by the accompanying

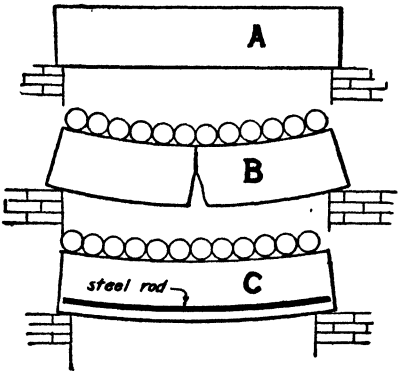


diagram. In this *A* represents a beam; when loaded, this beam will deflect downward in proportion to the load, and if it be of concrete, the concrete on the lower plane of the beam will crack in tension, under a very low load, as shown at *B*, and the beam will fail. If, however, a steel bar be placed, as shown at *C*, the steel, which is very strong in tension, will take the pulling force in the bottom of the beam, which will bend slightly under the same load as in *B*, but will not crack or break.

By virtue of the judicious combination of these two materials reinforced concrete can be used for the same purposes and in the same general disposition of members as can steel or wood, materials which are equally strong in tension and compression. At the same time the reinforced concrete possesses superior qualities of wear and longevity and is often much cheaper. In consequence it is being rapidly adopted for all structural purposes, such as for buildings, bridges, dams, wharves, docks, pipes, etc.

Normally it is built in the field. Forms, of wood or steel, outlining the shapes of the finished elements of the structure are first erected, and in them are placed the steel rods, so disposed as to take up the tensile stresses, and then the concrete is poured around the steel in the forms. After it has set, the forms are taken down and there is left a monolithic structure of concrete members reinforced with steel rods, which in good design should be tied together at every connection to insure the monolithic character. In a special type of reinforced-concrete construction the various members of the structure are cast as separately molded members in a casting yard and, after having set hard, are erected and tied together with concrete and steel joints, in a somewhat similar manner to the erection of timber and steel structures.

Concrete Blocks. Another very common application of concrete is the concrete block. This

is generally small, say 8 × 8 × 16 inches, with openings running vertically to reduce the weight, save material, and provide interior air space, which is cast of a sand and cement mortar in specially made machines. It is used largely in minor building operations, being set up in the wall with mortar joints. Its advantages are the ease and cheapness with which it can be made and the usual easy accessibility of the materials which make it up. Poor manufacture and materials very easily degrade the quality of the block, and as they are generally made by small operators on a small scale, they are very apt to prove weak and dangerous. When properly made, however, they are most satisfactory.

For some classes of heavy construction, such as dams, breakwaters, dock, etc., concrete is cast in a yard in large blocks of derrick size and set in place as in stone-masonry practice. These are not called "concrete blocks," that term being reserved for the small hollow building block noted above.

Wear. Since concrete is a field-made product subject to the lax workmanship and untoward conditions that that implies, and since its ingredients all necessarily require the closest inspection, it is not invariable in quality. When well made and of proper constituents, it is an admirable building material; it is highly fire and weather resisting, water-tight, and of long life. So far as the records show there is no limit to the continuance of these qualities in a good concrete. On the other hand, there is a great deal of poor concrete made, and this is subject to the attack of all kinds of deteriorating influences which bring about its gradual decay. The only safeguard is competent supervision of the making of the concrete.

Surface Finish. The texture of the face of concrete is in part affected by the nature of the form against which it is cast, but normally concrete has a dead, mouse-colored surface which requires some further treatment in any exposed work. This treatment may be the use of specially selected aggregate which is worked to the surface during laying, the tooling of the hardened surface as in stone masonry, or the scrubbing of the surface with brick or a wire brush to bring out the aggregate. At considerable expense various natural building stones may be faithfully imitated in concrete by some one of these methods.

Bibliography. Taylor and Thompson, *Concrete: Plain and Reinforced* (New York, 1912); Hool, *Reinforced Concrete Construction* (ib., 1913); Turneaure and Maurer, *Principles of Reinforced Concrete Construction* (ib., 1910); *Engineering News* (ib.); *Engineering Record* (ib.); *Concrete and Cement Age* (Detroit).

See CEMENT; MORTAR; BRIDGE; BUILDING; FOUNDATION; VIADUCT.

CONCRETE, REËNFORCED. See CONCRETE.

CONCRETE TERM. In logic, any name, whether substantive or adjectival, which denotes a thing and connotes a quality. See CONNOTATION; DENOTATION.

CONCRE'TION (Lat. *concretio*, coalescence, from *concrescere*, to grow together). A term used in medicine to denote a formation of solid, unorganized masses within the body, either by chemical precipitation from the secretions, or by the accidental aggregation of solids introduced into the system from without. If composed of precipitates in the urinary bladder, gall bladder, or salivary ducts, concretions are called calculi. (See CALCULUS.) They may also be found in former cavities in the lungs, as well as in tubercular joints, in which cases they are composed of lime salts. They may be found in the fingers and toes of gouty patients, appearing in nodules projecting from the sides of the joints, and termed tophi, or crabs' eyes. These nodules are frequently composed of urate of sodium. Concretions composed of fecal matter are frequently found in the vermiform appendix, in cases of appendicitis; very rarely a fruit seed is the basis and centre of such a concretion. Concretions have been formed upon pieces of catheter in the urinary bladder and upon beans in the nostrils. Concretions formed of balls of hair, concretions of Epsom salts swallowed undissolved, and concretions of cholesterin (q.v.) have been found in the intestines. See BEZOAR.

CONCRE'TIONARY STRUCTURE. A method of aggregation observed in some rock masses, particularly in the finer-grained sediments like chalk, limestone, and clay, whereby certain constituents have been collected together to form rounded symmetrical bodies that may closely simulate the work of human hands. They are variable in size and shape, but usually take the form of balls, disks, ovate and botryoidal masses which range from an inch or less to several feet in diameter. In any one rock their substance is likely to be uniform. The most common materials that form concretions are calcium carbonate, clay ironstone, and silica. The flints found in the chalk formations of England and France are an example of siliceous concretions, as are also the chert nodules found in many limestones, e.g., the corniferous limestone of New York State. Lime concretions are illustrated by the smooth, rounded, and sometimes perforate objects that accompany recent clays, which are not infrequently taken for fossils, so striking is their resemblance to organic forms. Clay ironstone occurs abundantly in concretions in association with the coal measures from which it may be mined as a valuable iron ore. The nodules of that material not infrequently show a system of radiating cracks which have been filled by a deposit of calcium carbonate, forming a network of white veinlets that inclose rounded or polygonal areas of the black iron carbonate. Such masses are called septaria (q.v.); when cut and polished, they exhibit a mosaic pattern which is quite ornamental.

The origin of such nodules and concretions is regarded by most geologists as referable to processes acting subsequently to the formation of the stratum in which they occur; i.e., they were not primarily incorporated in the sediments, but have been built up layer after layer in place. The agency is probably water—the body of ground water that is constantly circulating through the rocks and carrying on the work of solution and precipitation of mineral materials. In most cases the deposition began about some nucleus of foreign matter, like a grain of quartz, a fossil plant, or shell. The principle involved in such selective precipitation has never been satisfactorily explained, but it bears some analogy to the force of crystallization. According to Dr. George P. Merrill, the formation of clay nodules may result from purely mechanical processes, of which he cites an instance that came under his observation. In that case, however, the materials were of the same kind as

those forming the sediment, whereas in true concretionary structure they are usually of contrasting character to their immediate surroundings. Another type of concretionary structure is exemplified by oölite (q.v.).

CONCU'BINAGE (from OF., Fr. *concubine*, from Lat. *concubina*, concubine, from *concumbere*, to lie with, from *com*, together + *cubare*, to lie). In general, the cohabitation as husband and wife of a man and woman who are not lawfully married to each other. Specifically, a form of polygamy in which the primary matrimonial relation is supplemented by one or more secondary and inferior relations of the same kind. It was used, technically, in the former sense, in the common-law action for dower, in the allegation that the woman claiming dower was not a wife lawfully married to the party in whose land she seeks to be endowed, but his concubine. In the United States the term has been applied, under the Edmunds acts of 1882 and 1887, to the polygamous relations of the Mormons, at which the acts were aimed. In its general sense, as denoting merely unlawful cohabitation, concubinage, however abhorrent to the moral sense of the community, is not in most jurisdictions obnoxious to the criminal law. In its special sense, however, as signifying a plurality of wives, it comes under the penalties of bigamy and polygamy (qq.v.).

The earliest Roman laws were distinguished for the strictness with which they treated marriage. They not only upheld thoroughly the principle of monogamy, but they fettered marriage itself with many burdensome forms. Hence arose the practice of a free unmarried man entering into a less strict relation with a single woman—a sort of permanent cohabitation. The offspring of such a connection, called "natural" children, had not the rights of legitimate children, but they were recognized by the father. Augustus, with a view to promote regular marriages and check the growing licentiousness, enacted a comprehensive marriage law (*Lex Julia*), which discouraged concubinage, restricting it to women of low rank or those who had lost their station. Christianity required the complete sanctity of marriage and taught that concubinage was sinful, and we find the Synod of Toledo legislating against it as far back as 400 A.D. The ancient laws of the Germans recognized, along with regular marriage, an informal connection of the sexes. In the Middle Ages a similar connection became customary, called a left-handed, or morganatic marriage. See MARRIAGE, and consult the authorities there referred to. See HETÆRÆ.

CONCUR'RENCE (ML. *concurrentia*, concurrence, from *concurrere*, to run together, from *com-*, together + *currere*, to run) and **COL'LINEAR'ITY** (from Lat. *com-*, together + *linea*, line). If several lines have a point in common, they are said to be concurrent. The common point is called the vertex of the pencil of lines. If several points lie on one straight line, they are said to be collinear. The line is called the base of the range of points. That portion of geometry concerned with concurrent lines and collinear points is called the theory of concurrence and collinearity. Some of its fundamental propositions are:

If a transversal intersects the sides of a triangle ABC in the points X, Y, Z, the segments of the sides of the triangle are connected by the relation $(AZ : ZB) \cdot (BX : XC) \cdot (CY : YA) = -1$. Conversely, if the points are so taken that the relation holds, then the three points are collinear. (This relation is known as Menelaus' theorem.)

If the three lines AO, BO, CO drawn from the vertices of the triangle ABC are concurrent in O and meet the opposite sides in X, Y, Z, it follows that $BX \cdot CY \cdot AZ = -CX \cdot AY \cdot BZ$, and conversely (Ceva's theorem).

If three lines perpendicular to the sides of a triangle ABC at X, Y, Z are concurrent, then $BX^2 - XC^2 + CY^2 - YA^2 + AZ^2 - ZB^2 = 0$.

Conversely, if this relation holds, the perpendiculars are concurrent.

If the lines joining the vertices of two triangles are concurrent, their corresponding sides intersect in three collinear points. (This proposition, known as Desargues's theorem, is true for any rectilinear figures.)

The opposite pairs of sides of a hexagon inscribed in a conic intersect in three collinear points (Pascal's theorem).

The lines joining the opposite vertices of a hexagon circumscribed about a conic are concurrent (Brianchon's theorem).

The polars of a range of points with respect to a circle (q.v.) are concurrent, and conversely.

If from any point on a circle perpendiculars are drawn to the sides of an inscribed triangle, the feet of these perpendiculars are collinear. (The base of this range is called Simson's line.)

From these and other similar theorems many properties of elementary geometry follow at once; as, the altitudes of a triangle are concurrent, the medians of a triangle are concurrent, etc. The theorems of Pascal and Brianchon lead to numerous theorems in modern geometry. Consult: Cremona, *Elements of Projective Geometry*, trans. by Leudesdorf (Oxford, 1885); Casey, *Sequel to Euclid* (Dublin, 1888); McClelland, *Geometry of the Circle* (New York, 1891); Veblen and Young, *Projective Geometry* (Boston, 1911).

CONCURRENT JURISDICTION. The jurisdiction that exists where two or more courts possess the equal and coördinate right of taking cognizance of a single cause. Thus, in the United States, a justice's court and a city court may often take cognizance of the same matter; or a court of common pleas and a superior court may do the same. In criminal cases it is an established rule that, when one court has brought an offender before it, the court having concurrent jurisdiction is thereby debarred from taking cognizance of the case. In civil trials it is the privilege of the person appealing to the law—i.e., in most cases, the plaintiff—to choose before which of the two coördinate courts he wishes to bring the matter. The phrase "concurrent jurisdiction" is used in opposition to *privative*, or exclusive, jurisdiction, i.e., where only one court has the right of hearing and determining the matter at issue.

In the political system of the United States, with its Federal courts exercising jurisdiction over the same persons as are subject to a local State jurisdiction, the occurrence of cases of concurrent jurisdiction is very common. Where it exists, a decision of a State court may, in a proper case, be taken up to the Supreme Court of the United States for review. See COURT; JURISDICTION.

CONCUSSION OF THE BRAIN (Lat. *concussio*, shock, from *concutere*, to shake together,

from *com-*, together + *quatere*, to shake). The name given to a group of symptoms which result from injuries to the head, but are not due to fracture or to perceptible laceration of vessels or brain substance. The condition has been widely discussed and extensively studied by many means of experimentation, but authorities still disagree as to whether it is due to laceration of minute blood vessels, to molecular changes in the brain cells, or to a change in the disposition of the cerebrospinal fluid. Surgeons deny that concussion of itself is fatal, and autopsies show almost invariably some apparent lesion of vessels or brain substance in those fatal cases which have simulated concussion, but which were really instances of contusion or laceration. The symptoms vary in mild and severe cases. In the former, when the patient is "stunned" by a fall or a blow on the head, there are dizziness, disturbances of vision and noises in the ears, loss of strength, so that the patient falls, the face is pale and covered with a cold perspiration, the respiration is shallow, the pulse feeble and often slower than normal. In graver cases these symptoms become intensified, or the most extreme symptoms may develop instantly. There is complete unconsciousness, the body is cold and relaxed, the pupils widely dilated and unresponsive to light, the respiration scarcely distinguishable, the pulse weak, irregular, and slow. Vomiting is also frequent. This condition may last for several hours or even for a day or more, after which reaction slowly occurs, and recovery is complete. Frequently the symptoms of contusion or hemorrhage may follow, and the subsequent history becomes that of severe brain injury. Protracted symptoms of concussion are usually regarded as suggestive of a more serious injury. The treatment is expectant; it consists in the application of warmth to the body, stimulation of respiration and pulse if necessary, and in keeping the patient in absolute quiet. A surgical operation is, of course, not indicated in pure concussion, but only in such cases as give symptoms of gross brain lesions. See SHOCK.

CONDAMINE, CHARLES MARIA DE LA. See LA CONDAMINE.

CONDÉ, kôn'dā', FAMILY OF. One of the great families in France, and a branch of the house of Bourbon. It took its name from the town of Condé. (See CONDÉ-SUR-L'ESCAUT.) The first to bear the title of Prince de Condé was Louis, the youngest son of Charles de Bourbon, Duke of Vendôme. (See below.) The family became extinct in 1830. It gave many famous men to France, of whom the following are the most noted:

LOUIS I DE BOURBON, Prince de Condé (1530–69), appears in 1549 as gentleman of the royal bedchamber. He distinguished himself at the siege of Metz (1552), and in the battle of Saint-Quentin (1557). But the court was under Guise influence, and no Bourbon could expect advancement. Condé, who had early imbibed Protestant ideas, threw in his lot with the Huguenots on the accession of Francis II in 1559. He took part in the conspiracy of Amboise, formed by the Huguenots for the overthrow of the Guises. The capture and imprisonment of the chief Huguenot leaders followed, and Condé escaped execution only through the opportune death of the King. The balance of power rested in the hands of Catherine de' Medici (q.v.), who liberated Condé and made him Governor of Picardy. After the Massacre of Vassy (1562) Condé and Coligny took up arms against the Guise faction, but they were defeated at Dreux in the same year, and Condé was taken prisoner. He was, however, liberated in the year following by the pacification of Amboise. Owing to fresh persecution, the Huguenots again took up arms in 1567; an unsuccessful attempt to seize the person of the King was followed by the indecisive battle of Saint-Dénis, in which the Catholic leader, the Constable de Montmorency, was slain, and in 1568 another treaty of peace was made. Condé, however, learning of court intrigues against his liberty, renewed the conflict. The battle of Jarnac (March 13, 1569) resulted most disastrously for the Huguenots. Condé rashly exposed himself and was wounded and taken prisoner. While his wounds were being dressed, he was assassinated by Montesquieu, a Swiss mercenary captain, possibly at the command of the Duke of Anjou, whom Condé had offended. "He was distinguished," says the Duc d'Aumale, "by great ardor and gayety, the desire and the gift of being pleasant, by a resolute character, a proud soul, and a great and generous heart." Of the four sons who survived him, the eldest, Henri I (1552–88), joined the Huguenot cause, but renounced his religion to save his life at the time of the Massacre of St. Bartholomew. He again took up arms for Protestantism in 1585 and was excommunicated by Pope Sixtus V. After several successful encounters with the forces of the League, Condé was wounded at Coutras (Oct. 20, 1587) and died a few months later, not without grave suspicions of foul play on the part of his wife and attendants. The legitimacy of his only son, Henri II (1588–1646), was a matter of great dispute; but finally he was allowed to succeed to the titles and estates of his father, and, for a time at least, was looked on as the heir presumptive to the French crown. This contingency was removed by Henry IV's second marriage and the birth of the Dauphin Louis (1601). After a life at court, devoted to the aggrandizement of his family and marked by opposition to the Huguenots, Henri II de Condé died in 1646. He was the father of the Great Condé.

LOUIS II DE BOURBON (1621–86) is known in history as the Great Condé. After a thorough education in the Jesuit seminary at Bruges the young Prince, who was known as the Duc d'Enghien during the lifetime of his father, was introduced at court, and the next year, at the age of 18, was made Governor of Burgundy. To further his father's political aims, he was forced, in 1641, to marry the niece of Richelieu, much against his inclination. Meanwhile he had entered the military service and distinguished himself in the Netherlands, but his great triumph came in 1643, when, at the battle of Rocroi, he outmanœuvred the Spanish infantry, raised the siege, and inflicted a severe defeat on the enemy. Other successes followed, and Condé was promoted and sent to Alsace, in the summer of 1643, to coöperate with Turenne. After the victory of Freiburg, the capture of Philippsburg, Mainz, and other cities on the Rhine, Condé returned in triumph to Paris for the winter, but in 1645, after the defeat of Turenne by Mercy, he again took the field and by his splendid dash and energy won a series of victories culminating in that of Nördlingen in 1645, where Mercy was killed. Associated with the Duke of Orléans in

the Netherlands in 1646, Condé won several brilliant victories. The death of his father in the same year made him head of the Condé family, gave him possession of vast estates and a large fortune, and made him the highest personage in the state after the King and the Duke of Orléans. Though feared by Mazarin, Condé was given the chief command in the Netherlands and made captain general of the French forces. The victory at Lens in 1648 added to his fame, and he was recalled to Paris to suppress the rising of the Fronde (q.v.). After many intrigues, plots, and counterplots the court returned to Paris. Condé's haughtiness of manner and dictatorial measures, however, soon alienated the Queen and nobles, and by the advice of Mazarin he was arrested, with other members of his family. The threatened advance of Turenne, the murmurs of the Fronde, and the activity of friends soon secured Condé's release. The discomfiture and flight of Mazarin again brought Condé to the front, but the failure of the court to fulfill its promises and the suspicions he entertained that his assassination was contemplated roused him to fresh rebellion in 1651. His former ally, Turenne, was now on the side of the court, and after Condé had won the battle of Bléneau (April, 1652) and advanced on Paris, he was met by Turenne at the head of the royal troops. A bloody and indecisive conflict ensued, the net result of which was so to weaken the Frondeurs that most of them consented to a treaty of peace. Condé, however, rejected the proffered terms, and after a vain effort to retrieve his cause and seize Paris, went over to Spain. In the war which followed he acted as commander in chief of the Spanish forces in Flanders, but, despite his brilliant strategy, could gain no advantage over Turenne, who opposed him, and he was finally badly defeated in the battle of the Dunes (June 14, 1658) by the allied French and English forces. When the Peace of the Pyrenees was made (1659), Condé was pardoned and again entered the service of France. In 1673 he commanded in the Netherlands and the next year fought a drawn battle at Seneffe with William of Orange. This was the great general's last important battle, though in 1675 he succeeded Turenne, on the latter's death, in command of the army on the Rhine. Disabled by gout, he resigned his post and retired to his estate at Chantilly. There he devoted himself to religious exercises varied by the pursuit of literature and the society of his friends. He was intimate with Molière, Racine, Boileau, Bossuet, and La Bruyère. He died at Fontainebleau on Dec. 11, 1686, and his friend Bossuet pronounced the now famous *Oraison funèbre* over his bier. Though proud, and acting always from motives of selfish ambition, Condé was without doubt one of the greatest men of his time. The only surviving son of the Great Condé, Henri Jules (1643–1709), inherited some of the ability of his father, while his grandson, the Duke de Bourbon, known as *Monsieur le Duc*, was a prominent figure at the time of the Regency.

LOUIS JOSEPH DE BOURBON, Prince de Condé (1736–1818), the son of the Duke de Bourbon, was born in Paris, Aug. 9, 1736. He distinguished himself in the Seven Years' War. At the outbreak of the Revolution he showed himself a strong supporter of the monarchy, and in 1792 took up arms against the Republic, organizing on the Rhone a body of *émigrés*, which coöperated with the Austrians and was known as "the army of Condé." After the Peace of Campo Formio (1797), he entered the Russian service and in 1801 fought in that of England. His last years were spent at Chantilly. He was the author (1798) of an *Essai sur la vie du grand Condé*. His son Louis Henri Joseph (1756–1830) was the last of the Condé princes. He was wounded at the siege of Gibraltar in 1782 and later served under his father against France. His eldest son was the hapless Duc d'Enghien (q.v.), executed in 1804 by order of Napoleon. After the Restoration, Condé settled his fortune on the Duc d'Aumale, son of Louis Philippe, but in 1830 seemed to have thought of changing this will. Before doing so, however, he was found strangled, and it was judicially decided that he had committed suicide.

Consult: Duc d'Aumale, *Histoire des princes de Condé XVIe and XVIIe siècles* (7 vols., Paris, 1863–96); vols. i and ii translated into English by R. B. Borthwick (London, 1872); Lord Mahon, *Life of Louis, Prince of Condé* (ib., 1845); Fitzpatrick, *The Great Condé and the Period of the Fronde* (2d ed., ib., 1874); Crétineau Joly, *Histoire des trois derniers princes de la maison de Condé* (Paris, 1866); Muret, *L'Histoire de l'armée de Condé* (ib., 1844); Piépape, *Histoire des princes de Condé au XVIIIe siècle* (ib., 1911); Williams, *The Love Affairs of the Condés* (London, 1912).

CONDELL, kŭn'dĕl, HENRY (?–1627), and **HEMING,** JOHN (?–1630). English actors, whose names are forever linked with Shakespeare's. They both belonged to Shakespeare's company, and, with Burbage, were joint owners of the Globe Theatre. The great dramatist, as a token of lifelong friendship, bequeathed to them and Burbage 26s. 8d. to buy rings. And they in turn collected and edited his plays, "to keepe the memory of so worthy a friend and fellow alive" (first folio, 1623).

CONDEMNATION. See EMINENT DOMAIN.

CONDENSED MILK. See MILK.

CONDENS'ER (from Lat. *condensare*, to thicken, from *com-*, together + *densus*, thick, Gk. *δασύς, dasys*, thick). Any device for reducing gas or vapor to a liquid or solid form. The name is applied specifically to a variety of apparatus used in the arts besides appliances for condensing gases and vapors, as the part of a cotton gin which compresses the lint; a machine which takes the wool coming from the carding engine and rolls it into slightly twisted threads or slubbings ready for spinning; the arrangement of steam pipes used in sugar mills to evaporate the water in the cane juice preparatory to concentration. Condensers in steam engineering are apparatus for condensing the exhaust steam from an engine. They are invariably employed on ocean-going steam vessels and generally on coasting, river and fresh-water steamers, often in stationary power plants and seldom or never on locomotives or portable engines. The two distinct forms are the surface condenser and the jet condenser. The surface condenser consists essentially of a closed vessel containing a nest of tubes through which a current of cold water is passed and around which the exhaust steam circulates, thus keeping the condensed water separate from the cooling water, which is frequently salt or dirty. In the jet condenser the exhaust steam flows into an air-tight chamber, where it meets a spray of cool water which condenses it, and the condensed water and cooling or

injection water combined are then pumped out. This form of condenser is frequently used where a supply of fresh water is available for cooling purposes or where a very limited quantity of water of any kind is available and the cooling or circulating water is to be used over again. A modification of the jet condenser, known as the barometric or siphon condenser, is now used extensively. The condensing vessel is placed at the top of a pipe over 32 feet in height, whose lower end is immersed in water so that it forms the tube of a water barometer. The exhaust steam flows into the tube containing this water column at the top, meeting there the spray or injection of cooling water which condenses it. Gravity tends to empty the water in the vessel, because the combined waters then drop down the pipe and become part of the water column, some of which flows out at the lower end. Hence a Torricellian vacuum is maintained at the top of the column except so far as the vapor of water is present, and entrained air. A dry-air pump is used with this apparatus to take away the air that comes to the condenser with the steam and collects at the top of the barometric column. See STEAM ENGINE.

CONDENSER. A form of electrical apparatus used to accumulate a charge of electricity. A condenser in its simplest form consists of two conductors which are separated from each other by an insulating medium or dielectric. The name dates from the time of the fluid theory of electricity, when it was believed that a certain amount of the electric fluid could be collected or condensed on a conducting surface. The principle of the apparatus is illustrated in the Franklin plate, which consists of a plate of glass with pieces of tin foil on each side. If a positively charged body or the positive conductor of an electric machine is connected with one of the tinfoil coatings, it will communicate to it by conduction a positive charge of electricity. If now the opposite plate is connected with the ground, the negative electricity is held bound, while the positive is repelled and passes to the ground. Accordingly we have accumulated equal amounts of positive and negative electricity on the tin foil, and if the two surfaces are connected a bright spark results and the equilibrium is restored. Otherwise the charge remains on the surface of the conductors until it is dissipated by leakage. The energy which is stored up in the condenser is expended in producing the spark. The amount of electricity that can be accumulated depends upon the capacity of the condenser and the potential of the charge. The Leyden jar consists of a Franklin plate in a cylindrical form, and as it is more compact and has greater capacity, it is more often used. In practice, however, the usual form of condenser consists of sheets of tin foil separated from each other by paraffined paper, or in the case of standard condensers sheets of mica, with the alternate sheets of tin foil connected together to give considerable capacity. The apparatus may be arranged so as to afford various amounts of capacity, and is much used in cable testing and other branches of electrical work. The unit of capacity is the farad (q.v.), but condensers are generally constructed to give capacities in fractions or multiples of a microfarad ($\frac{1}{1000000}$ farad), which is the unit ordinarily employed. See ELECTRICITY.

CONDER, CLAUDE REIGNIER (1848–1910). An English army officer and writer on the topography and archæology of Palestine. He was educated at University College, London, and entered the Royal Engineers. In 1872–78 and 1881–82 he commanded the survey of Palestine. He afterward served in Egypt (1882), in Bechuanaland (1884–85), on the Transvaal Border as British Commissioner, at the headquarters of the Ordnance Survey (1887–94), in Irish relief work (1895), and on the Irish Ordnance Survey (1900–05). He contributed to Smith's *Bible Dictionary.* Among his important works are: *Tent Work in Palestine* (1878); *Judas Maccabæus* (1883); *Heth and Moab* (1883); *Memoirs of the Palestine Survey* (1883, 1890); *Primer of Bible Geography* (1884); *Palestine* (1891); a translation of the Tel el-Amarna tablets (1894); *The Latin Kingdom of Jerusalem* (1897); *The Hittites and their Language* (1898); *The Rise of Man* (1908); *The City of Jerusalem* (1909). He published in 1869 a series of illustrations for Bunyan's *Pilgrim's Progress* and made illustrations as well as maps and charts for his own books.

CONDER, JOSIAH (1852–). An Anglo-Japanese architect, born in London. He was educated at the Kensington Art Schools, in the Slade life classes of University College, and at the Royal Institute of British Architects. In 1876 he was engaged by the Japanese government as professor of architecture to the Imperial Japanese Engineering College of Tokyo, and as architect in the Public Works Department. He was also lecturer on architecture at the Imperial Tokyo University. In 1884 he received the fourth-class decoration of the Rising Sun and in 1894 the third-class decoration of the Sacred Treasure. Finally he was retired with a life pension and with the office of honorary consulting architect to the Imperial Japanese government. His publications include: *Landscape Gardening in Japan* (1893); *The Floral Art in Japan* (1899); *Paintings and Studies by Kawanabe Kyosai* (1911).

CONDÉ-SUR-L'ESCAUT, kôn'dā' sụr lĕs'kō' (Fr., Condé on the Scheldt, from Gall. *condat,* confluence + Fr. *sur,* on + *Escaut,* Scheldt). A town in the Department of Nord, France, at the confluence of the Haine and the Scheldt, 8 miles northeast of Valenciennes, of which it is the entry port (Map: France, N., J 2). It dates from the Roman period and gave its name to the noble family of Condé. It has an interesting castle, a church, an arsenal, and strong fortifications constructed by Vauban. It has belonged to France since 1678. It manufactures starch, chicory, leather, soap, and boats. Pop. (commune), 1901, 4960; 1911, 5213.

CONDÉ-SUR-NOIREAU, nwä'rō'. A town in the Department of Calvados, France, on the Noireau and Drouance rivers, 33 miles south-southwest of Caen by rail (Map: France, N., E 4). Among its notable features are the two venerable churches of St. Sauveur and St. Mark, and a bronze statue of Dumont d'Urville, the famous navigator, a native of the town. It is a busy industrial centre, with cotton-spinning factories, manufactures of cutlery, leather, thread, cotton and linen fabrics, oils, and ironworking, and an important trade in cattle, honey, and other agricultural products. Pop., 1901, 6591; 1911, 5004.

CONDILLAC, kôn'dē'yàk', ETIENNE BONNOT DE (1715–80). A French philosopher. He was born at Grenoble and in 1768 became a member of the French Academy of Sciences. He never

attended the meetings of the Academy after his reception as a member and passed his life mostly in great retirement. He died at his estate near Beaugency. In 1746 he published his *Essai sur l'origine des connaissances humaines*, a work which represented the views of Locke (q.v.). In his later works he carried out the sensational side of Locke's philosophy with great consistency. He believed that "the ego of each man is only the bundle of the sensations he experiences and of those which memory recalls." He later, in his *Traité des sensations*, illustrated his view by describing an imaginary consciousness, possessed by a marble statue, growing as it receives one by one various sense faculties. In addition to his first essay, he wrote: *Traité des systèmes* (1749); *Recherche sur l'origine des idées que nous avons de la beauté* (1749); *Traité des sensations* (1754); *Traité des animaux* (1755); *La logique* (1781), besides 13 volumes of textbooks he had prepared when tutor to the Duke of Parma, grandson of Louis XV. Several editions of his collected works have been published (1798, 1803, 1822). Consult: Dewaule, *Condillac et la psychologie anglaise contemporaine* (Paris, 1892); Lewes, *History of Philosophy* (London, 1880); Réthoré, *Condillac ou l'empirisme et le rationalisme* (Paris, 1864); Robert, *Les théories logiques de Condillac* (ib., 1869).

CON'DIMENTS (Lat. *condimentum*, from *condire*, to season, from *com-*, together + *-dere*, Skt. *dhā*, to put). Seasoning agents, or substances employed at table for the purpose of imparting a flavor or seasoning to the ordinary solid or liquid food. The greater part of condiments are necessary to sustain the proper functions of the alimentary system and, besides gratifying the appetite, minister to the wants of the structure. The principal condiments are saline substances, such as common salt; acidulous bodies, such as acetic acid or vinegar; oily condiments, such as butter and olive oil; saccharine substances, such as sugar and honey; and aromatic and pungent condiments, such as mustard, ginger, pepper, and pickles.

CONDI'TION (OF. *condicion*, Fr. *condition*, from Lat. *condicio*, agreement, from *condicere*, to agree, from *com-*, together + *dicere*, to say). The popular name in American college parlance for a deficiency on the part of a student in examinations. It derives its force from the fact that the student is permitted to go on with his class only on *condition* that the deficiency be made good within a given time, failing which his name is dropped from the college rolls.

CONDITION. In natural science and metaphysics, that in default of which a phenomenon does not occur. (See CAUSALITY.) In logic it denotes any qualification of the universal validity of a statement. See LOGIC.

CONDITION and **CONDITIONAL.** As a legal term, "condition" signifies a provision in a contract, conveyance, grant, or will, that an estate or interest in property, or a personal obligation, shall depend upon the happening of an uncertain event. The term is also applied to the event itself. If the condition is set forth in words, it is called an *express* condition; if it is inferable from the circumstances of the particular case, it is called an *implied* condition. In English law conditions are also classified as conditions *precedent* and conditions *subsequent*. An example of the former is the grant of an estate to A upon condition that he marry B; or the contract to charter a ship upon condition that it is in the port of Amsterdam. Here the event named must happen before the estate vests in A, or the contract obligation on the part of the hirer of the ship arises. An example of a condition subsequent is the grant of an estate to A upon condition that he continues to reside in a particular place; or the purchase of a piano upon condition that it shall "stand up to correct pitch" for a year. Here the estate in A, or the obligation of the purchaser to keep and pay for the piano, is annulled upon the nonperformance of the condition. Impossible, illegal, or repugnant conditions are void. Accordingly, says Blackstone, "if they be conditions subsequent, the estate shall become absolute in the tenant, for he hath by the grant the estate vested in him, which shall not be defeated by a void condition. But if the condition be precedent, he shall take nothing by the grant, for he hath no estate until the condition is performed."

A provision in a contract which is intended to operate as a condition in favor of one party may contain a binding promise of the other party. For example, A agrees to sell and deliver to B at a named time, place, and price a certain quantity of merchantable corn; and A tenders unmerchantable corn at the agreed time, place, and price. B has the right not only to reject the corn, because the condition precedent to deliver merchantable corn has not been performed by A, but also to recover from A damages for breach of contract to deliver the agreed corn. Such a provision in a contract may be called a promissory condition. Of this class are the mutual promises of the seller to deliver the goods and of the buyer to pay for them—engagements which are sometimes called "concurrent conditions." Promissory conditions have been confused with warranties (see WARRANTY) by many judges and writers, but the English Sale of Goods Act of 1893 makes a sharp distinction between the terms and has done much to clear up the confusion in this branch of the law. See SALE.

Another and distinct class of provisions in contracts may be styled *casual* or *contingent* conditions, because they are intended to prevent any obligation attaching to either party until their performance. An example of this class is afforded by an agreement for the sale of described goods to arrive by a specified ship. Here, if the ship does not arrive, or, if arriving, it has not the described goods on board, neither party is bound.

The word *conditional* frequently appears in standard legal phrases, some of the more important of which are the following: *Conditional acceptance* (of a bill of exchange) is an acceptance in which payment by the acceptor is dependent upon the fulfillment of a condition therein named; *conditional advance note* is a note given by the master of a ship to a seaman, payable after the ship sails upon condition that the seaman goes with the ship; *conditional allotment, conditional application*, is the allotment of shares in a company, or the application for shares, made upon a specified condition. In the former case the applicant is not bound to take the shares unless he has assented to the condition, nor in the latter case unless the condition is performed. Consult: Blackstone, *Commentaries on the Laws of England;* Benjamin, *Treatise on the Law of Sale*

of Personal Property (7th ed., Boston, 1899); Burdick, *Law of Sale of Personal Property* (2d ed., Boston, 1901).

CONDITIONAL FEE. At common law, an estate granted to a man and the heirs of his body. This limitation to a particular line of heirs, to the exclusion of collateral lines, was interpreted by the courts merely as a condition diverting the estate in the event that no issue was born answering the description of the grant, and the fee thus came to be known as a conditional fee. The condition being performed by the birth of issue, such estates became absolute and might then be alienated to strangers and the expectations of the issue defeated. As conditional fees were a device of the great landowners to preserve their estates intact for their lineal descendants, they procured the enactment of a statute by Parliament forbidding such alienation and preserving the interests of the issue as well as of persons to whom the property was to go on failure of issue. This was the famous statute of Westminster II (1285), known as the Statute *De Donis Conditionalibus* ('concerning conditional gifts'), which had the effect of converting such estates into fees tail and of preventing the evils at which it was aimed until, by the ingenuity of the lawyers and judges, other means were devised for barring entails and alienating such estates. See CONDITION; COMMON RECOVERY; FEE TAIL; FEE SIMPLE; FINE. Consult the authorities referred to under FEE SIMPLE and FEE TAIL.

CONDITIONAL IMMORTALITY. The doctrine advanced by certain theologians that the immortality of the soul is conditional only upon faith in Christ and that immortality is not inherent in the race. See ANNIHILATIONISM.

CONDITIONAL LIMITATION. A fee-simple estate limited or qualified (*a*) so as to come to an end on the happening of a collateral event, or (*b*) so as to shift from one owner to another on such an event. The expression "conditional limitation" is used in both these senses by different law writers of great authority, and it is therefore impossible to affix to it a precise definition. The first use of the phrase identifies it with the limited or qualified fee simple; as a gift of land to A and his heirs so long as they shall continue to live on the premises, or so long as St. Paul's Church shall stand, or until the happening of any other event. Under the early common law the donor of such an estate had an interest left—notwithstanding the estate conveyed was a fee simple—known as a "possibility of reverter," and, upon the happening of the event specified in the deed, the property would revert or return to the donor or his heirs. This contingent interest remaining in the donor of a qualified fee has been referred to the feudal relation of lord and tenant, which might subsist between the grantor and grantee of a fee, and it has been supposed that the Statute *Quia Emptores* (1290), which did away with this feudal relation, thereby destroyed also the grantor's possibility of reverter and converted every qualified fee into an absolute fee. But it has been held, nevertheless, in several States, including New York and Massachusetts, that qualified fees of this type are still good, and that they will revert to the grantor and his heirs on the happening of the event on which they were conditioned, and these decisions are likely to be followed in other States. But neither at the common law nor today has the grantor of such a fee any interest which he is capable of alienating to any other person prior to the return of the estate to him.

The second meaning of the expression "conditional limitation" makes it a convenient phrase for the commoner terms "executory devise" and "shifting use." While at the common law a gift of a fee simple, even though qualified as above described, was supposed to exhaust the whole power of alienation, if not the entire interest, of the donor, leaving him no capacity to give the property over, on the happening of a future contingency, to another; yet, as a result of the Statute of Uses (passed in 1527) and the Statute of Wills (enacted in 1532), it became possible to make a fee which should, upon a specified future event, shift to another. Thus, if land be devised by will to X and his heirs on condition that they shall forever maintain their citizenship in New York, with the further proviso that in the event of a failure to comply with the condition within the lives of the donor's children the property should go over to a charity, the last-mentioned gift might take effect as an executory devise, or conditional limitation on the prior gift. Such limitations on fees are now very common and may, under modern statutes, usually be effected by a simple deed of grant, without invoking the aid of the Statute of Uses. See DEVISE; ESTATE; FEE SIMPLE; FEUDAL SYSTEM; SUBINFEUDATION; USE; WILL; and the authorities referred to under those titles.

CONDOM, kôn'dôn'. A town in the Department of Gers, France, on the river Baise, here crossed by two bridges, 25 miles north-northwest of Auch (Map: France, S., E 5). The town, founded in 721 (Condomus), is irregularly built, but has handsome suburbs. It has a fine Gothic cathedral of St. Pierre (1506–21), adjoined by the remains of an old cloister, now used as a municipal building. There is a very considerable trade in grain, flour, wine, sawmill products, paints, drugs, and especially in Armagnac brandy, and manufactures of cotton, and cotton yarn. Bossuet was at one time Bishop of Condom. Pop., 1901, 6578; 1911, 6380. Consult U. Chevalier, *Répertoire des sources topobibliographiques* (Montbéliard, 1894–99).

CONDONATION (Lat. *condonatio*, from *condonare*, to pardon, from *com-*, together + *donare*, to give, from *donum*, Skt. *dāna*, gift, from Lat. dare, Gk. δίδόναι, *didonai*, OChurch Slav. *dati*, Lith. *duti*, Skt. *dā*, to give). In law, forgiveness of an act, by a husband or wife, which entitles the forgiving party to a divorce. Condonation may be either expressed or implied. If the parties have cohabited after a knowledge of the offense complained of, this is an implied condonation of the offense, and bars complaint unless the offense shall have been subsequently repeated. An act once condoned is, in the eyes of the law, as though it had never been committed, unless the guilty party repeats the offense, in which event the old offense becomes a valid ground of complaint. In other words, condonation is always conditional upon the discontinuance of the condoned misconduct. See DIVORCE.

CON'DOR (Sp., from Peruv. *cuntur*, condor). Any one of several species of large American vultures. Usually applied to the great vulture (*Sarcorhamphus gryphus*) of the Andes, one of the largest of known flying birds, the albatross and the California condor sometimes ex-

ceeding it. Its dimensions, however, have often been far overstated, the truth being that it varies in length from 44 to 55 inches, and in expanse of wing from 8½ to 10½ feet. The wings are long and extremely powerful; the tail short and wedge-shaped; the general color black, showing brightest in old males, which have much white in the wing. The young are brownish. Around the lower part of the neck of both sexes there is a broad white ruff of downy feathers, above which the skin is bare and exhibits many folds. The head of the male is crowned with a large, reddish, cartilaginous comb, and the neck is furnished with a dilatable wattle. The beak is thick and strong, straight at the base, but the upper mandible is strongly curved at the extremity. The condor feeds mostly on carrion. Its voracity is enormous. Tschudi mentions one in confinement at Valparaiso which ate 18 pounds of meat in a single day and seemed next day to have as good an appetite as usual. Condors often gorge themselves so that they cannot fly and, if attacked, must disgorge in order to escape. They inhabit regions 10,000 or 15,000 feet above the level of the sea, where they are usually seen in small groups, and where they breed. They make no nest, but lay their eggs on the bare rocks. To these haunts they return, after their descent into the plains for food. The height to which the condor soars in the air exceeds that of any other bird and is often far above the clouds.

Closely related to the condor, but distinguished by differences in the cartilaginous comb, bare neck, and shape of the bill, are the king vulture, or king of vultures (*Gypagus papa*), of the warm parts of America, and the Californian vulture (*Pseudogryphus californianus*). The king vulture is about the size of a goose and derives its name from its driving away other vultures from prey at its pleasure. Its plumage is finely colored, reddish above, white beneath, with bluish gray ruff and black quills and tail. The Californian vulture is often longer and of greater expanse of wing than the condor, but is usually not so heavy a bird. It is duller colored, and has less white on the wings. Its range was restricted to the Pacific coast region, from Oregon southward; it was nowhere really common, and it has now become extinct, except in southern California. Like other American vultures, it has no voice, the only sound that it utters being a hoarse hiss or sort of weak snorting. All these large American vultures belong to the family Cathartidæ, which includes the turkey buzzards and is less falconine than the Old World vultures. See VULTURE and Plate of VULTURES; EXTINCT ANIMALS.

The first satisfactory account of the condors was given by Humboldt. Consult for South American condor: Darwin, *A Naturalist's Voyage* (London, 1860); Stejneger, *Riverside Natural History*, vol. iv (Boston, 1885); Lucas, *Annual Report of United States National Museum*, 1889 (Washington, 1891); Adams, *The Condor*, vol. ix (California, 1907); Beebe, *Zoölogical Society Bulletin, No. 31* (New York, 1908). For California condor, Finley, *The Condor*, vols. viii, ix, x (California, 1906; 1907; 1908); Beebe, *Zoölogical Society Bulletin, No. 32* (New York, 1909).

CONDORCANQUI, kōn'dôr-kän'kwē, JOSÉ GABRIEL. See TUPAC AMARU II.

CONDORCET, kôn'dôr'sâ', MARIE JEAN ANTOINE NICOLAS CARITAT, MARQUIS DE (1743–94). A French mathematician and philosopher of the Physiocratic school. He was born at Ribemont, was educated by the Jesuits, won distinction for mathematics in his youth, and became an active member of the Academy of Sciences in 1769. Gifted with a keen intellect and wonderfully universal sympathies, he became allied with the advanced thinkers and shared in the economic and religious propaganda of Turgot, D'Alembert, and Voltaire. An ardent supporter of the American Revolution of 1776, he wrote many papers concerning the United States, viz., *Lettres d'un citoyen des Etats-Unis sur les affaires présentes* (1788); *Lettres d'un Bourgeois de Newhaven à un citoyen de Virginie* (1787); *Réflexion sur l'esclavage des nègres* (1781), an interesting document on the question of negro slavery. He took an active part in the *Encyclopédie*, and, on the strength of his graceful *Eloges des Académiciens de l'Académie Royale des Sciences morts depuis 1666 jusqu'en 1699* (1773), he was made the perpetual secretary of the Academy of Sciences in 1777. He became a member of the French Academy in 1782. His *Eléments du calcul des probabilités* (1785), revised and enlarged in a posthumous edition (1804), was his most important contribution to mathematics. From this time politics claimed him in increasing measure. In 1786 he married Sophie de Grouchy, sister of the famous marshal, a brilliant woman of considerable talent, who later translated into French Adam Smith's *Theory of Moral Sentiments* (1798). He wrote a life of *Turgot* (1786) and of *Voltaire* (1787), and was chosen member of the National Assembly from Paris, becoming secretary of that body, and in February, 1792, its president. He composed several of its most important addresses and elaborated a scheme of public instruction which is the foundation of the present system of education in France. It was in this report (April 21 and 22, 1792) that he suggested five degrees of education: (1) primary schools; (2) secondary schools; (3) institutes; (4) lycées; (5) the Society of Arts and Sciences. Though finding Louis XVI guilty, he refused to vote for his execution. He was active in framing the constitution submitted to the Convention in February, 1793, but his opposition to the Terrorists led them to proclaim him an outlaw. Friends found him a refuge with a Madame Vernet, who said "the Convention could declare him outside the law, but not outside humanity." Fearful of being tracked hither and endangering his protectress, he escaped, was captured at Clamart by the Terrorists, and died in prison at Bourg-la-Reine, March 29, 1794, from apoplexy, exhaustion, or poison. While with Madame Vernet he wrote the *Esquissé d'un tableau historique des progrès de l'esprit humain*, a declaration of human perfectibility through emancipation from priests and rulers, narrow in its sensationalist philosophy and fanatic in its antispiritualism. His argument was based upon a succinct survey of the progress of humanity in the past, which led him to conclude that three distinct advantages were to be acquired by the human race: the destruction of inequality among men, the advance of equality in a given people, the amelioration of man himself. Condorcet's *Works* (Paris, 1847–49) contain a *Life* by Arago.

Consult: Morley, *Critical Miscellanies* (London, 1893); Cahen, *Condorcet et la Revolution française* (Paris, 1904); H. Sée, "Condorcet, ses idées et son rôle politique," in *Revue de Synthèse Historique* (1905); Eugène Caillaud, *Les idées économiques de Condorcet* (1909); Tallentyre, *The Friends of Voltaire* (London, 1906).

CONDOTTIERI, kŏn'dŏt-tyā'rē (It., pl. of *condottiere,* captain, leader). The name given in Italy in the Middle Ages to the leaders of companies of military adventurers who offered their services to any party in any contest for pay, and often practiced warfare on their own account for the sake of plunder. The name is frequently applied also to the members of their companies. These mercenaries were called into being by the frequent feuds of the Italian states during the Middle Ages. Among the most celebrated of their leaders were Sir John Hawkwood (c.1320–94), the commander of the famous White Company, who, after taking an important part in the wars between England and France, crossed into Italy and became captain general of Florence; Carmagnola (c.1390–1432), who fought in the pay of Milan and Venice and was executed at the latter city in 1432; and Francesco Sforza (1401–66), who in 1450 made himself Duke of Milan, to the exclusion of the lawful heirs of the Visconti. Venice began to employ condottieri in 1143, but their time of greatest activity was in the fourteenth and fifteenth centuries. Machiavelli paints them in the most unfavorable light and states that sometimes battles were fought by two condottieri in which no one was killed except by accident. Consult: Ricotti, *Storia delle compagnie di ventura in Italia* (2 vols., Turin, 1893); Block, *Die Condottieri: Studien über die sogenannten "unblutigen Schlachten"* (Berlin, 1913); Semerau, *Die Condottieri* (Jena, 1909).

CONDUCTING TISSUE. In botany, the system of vessels through which water and foods move from one part of the plant to another. See CONDUCTION.

CONDUCTION (Lat. *conductio,* union, from *conducere,* to lead together, from *com-,* together + *ducere,* to lead, connected with Goth. *tiuhan,* AS. *tēon,* OHG. *ziohan,* Ger. *ziehen,* to draw). In botany, a term applied to the transfer of water, foods, and other materials from one part of the plant body to another. In the smaller plants a sufficient amount of water can be supplied to cover evaporation and other needs, and the foods can be transferred, by relatively slow processes of diffusion and osmosis (qq.v.). In the larger plants, however, the amount of water and foods to be moved, and the relatively great distances to be traversed, have brought about the development of a system of tissues, arranged in elongated strands or in layers, specially adapted to facilitate transfer and known as the conducting system. These are for water chiefly the xylem, or wood, bundles, and for foods chiefly the phloëm, or bast, bundles, or perhaps the latex vessels. The xylem and phloëm bundles are usually associated, running side by side in the stems, the xylem either towards the centre, or with a phloëm bundle also on the central side of it, or surrounded by the phloëm. In the roots the primary xylem bundles are between the phloëm bundles, but by secondary thickening with age the same position as in stems is reached. So frequent is this association that the two bundles are usually described as regions of one fibrovascular bundle (q.v.). These bundles form a connected system of strands, continuous, through the stem, from youngest root to youngest leaf. In the leaves the bundles run in the larger ribs and constitute the smaller veins, becoming more and more slender. The final branches join with others to form a fine network, or end blindly among the green tissues, the xylem bundles being the last to disappear.

The Xylem and Water Conduction. The essential elements of the xylem are the tracheæ or tracheids, with which parenchyma cells and wood fibres are usually associated. The tracheids are cells whose walls have become unequally thickened as they mature; their protoplasm finally disappears, leaving only the empty cell wall. The tracheæ are similar, except that a large number of the end walls, where the elements of a row abut, have been resorbed, so that the cell chambers, empty as they finally become, communicate freely. The tracheæ, where best developed, are thus long tubes, half a millimeter ($\frac{1}{50}$ inch) or less in diameter, and 1 to 3 meters (3 to 10 feet) long. The remaining elements of the xylem are of less importance for conduction. (See MORPHOLOGY.) Through the xylem bundles the water absorbed by the roots travels to the leaves and other surfaces, from which it is evaporated. The water first enters the root hairs or the adjoining surface cells of the root (see ABSORPTION and ROOT); thence it traverses the cortex and enters the tracheary tissue and travels along it to its destination. Proofs that the xylem bundles are the path of the transpiration stream are found by girdling and by the use of colored solutions. When the xylem bundles are severed, the leaves wilt promptly, while all the other tissues of the stem may be cut without such a result. A solution of indigo carmine or eosin stains only the xylem strands when the cut end of a leafy shoot is plunged into it. It has further been shown that the water travels chiefly in the cavities of the tracheæ, though doubtless a portion traverses the walls themselves, and all must pass through many partition walls in its course. The movement is not at all like that of water in pipes or blood in vessels. The force concerned in the movement of water is not certainly known. In the smaller plants root pressure (q.v.) may cooperate, or under some circumstances may be sufficient; but it is not adequate to account for the rise in tall trees. Capillarity is to be excluded, since the conditions under which surface tension operates to raise water in small tubes are not present. Evaporation and the suction set up thereby play an important part; and probably the most important factor is the osmotic action in the living cells of the leaf. But no satisfactory explanation of the observed facts has as yet been found.

The Phloëm and Food Conduction. The essential elements of the phloëm are sieve cells and companion cells (parenchyma); often bast fibres accompany them. Sieve cells, like tracheæ, lose their living contents as they mature. The end walls, and often certain areas of the lateral walls, where they abut upon a like cell, become resorbed in spots and perforate. The perforate area is known as a sieve plate. Through the perforations the contents may pass freely. It has been shown that when the perforations in a membrane amount to less than 1 per cent of the area, there may pass through it 60 per cent of

the gases and solutes which could do so were the whole area open, provided they are being freely removed from the other side. In life the content of the sieve is a slime, in which are abundant the various foods, both proteid and carbohydrate. In addition to this evidence as to their function, girdling experiments have shown that when the phloëm bundles are severed the growth of parts beyond is hindered or stopped. Other tissues of the bundles participate in the transfer, but no decisive division of labor can be made out, beyond the fact that the sieve cells are most efficient.

Latex Vessels. The latex vessels are irregularly branched tubes (the branches sometimes connected into a network), containing a milky or colored sap called latex (q.v.). They are found in only 10 of the large families of plants, both monocotyledons and dicotyledons, in which they are believed to serve for the conduction of foods. The reasons for this are as follows: 1. The latex always contains, among a great variety of substances, foods whose amount varies much from time to time, and these variations seem to be correlated with variations in growth and development. 2. The latex vessels are developed early among the growing tissues where foods are needed. They have abundant branches in the leaves and special relations to the cells where food is made.

The mode by which the foods are transported in sieve cells and latex vessels is not known. The contents are under pressure from the turgor (q.v.) of adjacent living cells. Bending and the consequent mechanical compression would facilitate mixing of the contents. But diffusion movements are probably the main agency.

CONDUCTION OF HEAT. See HEAT.

CONDUCTOR (Lat., leader, from *conducere*, to lead together). In music, the person who directs the chorus or orchestra, or both combined, and who is responsible for the interpretation of the works performed by the artists under his direction. A good conductor must be a thorough musician. He must have had careful training in all branches of musical composition, must be familiar with the compass and peculiarities of the voice and all orchestral instruments; must be a good score reader, and a man of broad musical culture, familiar with the styles of various epochs and masters. In addition, he must be gifted with poetic temperament, an unusually fine ear, a forceful, magnetic personality that commands instant obedience, and great coolness and presence of mind. That he be also a fine performer on some instrument is not essential; two of the world's greatest conductors, Wagner and Berlioz, were wretched performers. The principal work of the conductor is not done in public during performances, but during rehearsals. His preparation really begins at home. He must make himself thoroughly familiar with the score of the work he is to conduct. This is best done at the pianoforte. He must have a clear idea of the form of the work, of the melos (q.v.), of the different phrases. Before he conducts the first rehearsal he has decided on the interpretation of the work and knows exactly what he wishes each performer to do.

The first rehearsal of a new work (especially if performed from manuscript) is largely taken up with correcting mistakes in the parts. Here the conductor's ear must be on the alert. During rehearsal the conductor can convey his instructions to the singers and instrumentalists by means of the spoken word, audible beating of the rhythm, and by singing or playing to them. In choral works the chorus is rehearsed separately with the piano. The soloists also rehearse privately, with the conductor at the piano, before rehearsals with full orchestra begin. In studying instrumental works, like symphonies, a careful conductor often rehearses the strings and wind instruments separately. After the performers have become thoroughly familiar with the conductor's intentions, they are ready to be guided during the public performance by his baton and by signals given with the hand or eyes. By that time the conductor practically knows the score by heart. It lies before him more for occasional reference than actual reading. People in general know very little about the real responsibility and importance of the conductor. Berlioz does not exaggerate when he says that a poor singer or instrumentalist can ruin only his or her part, but a poor conductor can ruin the whole performance.

While the essential functions of the conductor have been pretty much the same at all times, the manner of conducting has varied greatly. The custom of beating time with a baton can be traced to the remotest antiquity, when oarsmen were directed by such means. When the baton was introduced for beating time in music is not known. An ancient manuscript is preserved in Paris, showing Heinrich von Meissen, a minnesinger, who died in 1318, directing a group of vocal and instrumental performers by means of a baton. We know nothing of the mode of conducting between that time and 1600. The earliest operatic performances were conducted from the harpsichord. In the recitative the leader struck the few chords upon the instrument, and in the concerted pieces he led. This he did by nodding the head, stamping the foot, and using one arm or even both arms. When the opera reached France and Germany, this mode of conducting was naturally employed in these countries also. In Italy this method maintained itself up to the first half of the nineteenth century. In Germany we find before 1700 that at performances of sacred works in churches the organist was assisted by a time beater. This time beater was not a conductor; he only indicated the time. But shortly after the beginning of the eighteenth century the Italian operatic method was adopted for the church, and the organist was the sole director, as is still the custom in churches of to-day. The earlier symphonic works were also conducted from the harpsichord. When the number of wind instruments increased, it was found that the tones of the harpsichord could not be heard by all players, and the time beater again made his appearance. In this manner Haydn and Mozart conducted their symphonies, they sitting at the harpsichord while some one else beat time. Beethoven conducted with the baton, and the first violin or concert master assisted.

Interpretative conducting may be said to have begun with Stamitz (1719–61) and his pupil Cannabich (1731–98), whom Mozart called the best conductor he ever heard. Cannabich developed the *crescendo* and *diminuendo* of the orchestra, one of the great means of expression. Gossec (1738–1829) must also be mentioned among the early conductors who developed orchestral technics. But these men were exceptions at their time. Interpretative conductors as a class did not exist before the beginning of

the nineteenth century. Among these the greatest were Spohr, Weber, and Mendelssohn in Germany, and Habeneck, a German by birth and training, in France. With Wagner and Berlioz begins the school of modern conducting, which is the culmination and natural development of the work begun by the four eminent conductors just mentioned. At first all the great modern conductors were German. France soon followed, a little later Italy and Russia, still later England. The beginning of this century marked the advent of the guest conductor who goes on extended tours like the great instrumentalists and vocalists, frequently with his entire orchestra. Among the best treatises on conducting are: Wagner, *Ueber das Dirigieren* (vol. viii of his collected works, Leipzig, 1888); Berlioz, *Treatise on Modern Instrumentation*, trans. by Bennett (London, 1882). Consult A. Chybinski, *Beitrage zur Geschichte des Taktschlagens* (Leipzig, 1912); H. Löbmann, *Zur Geschichte des Taktierens und Dirigierens* (Düsseldorf, 1913); G. Schünemann, *Geschichte des Dirigierens* (Leipzig, 1913).

CONDUCTOR and **INSULATOR OF ELECTRICITY.** The property of electrical conductivity is possessed in some degree by all known substances. There is, however, an enormous difference between the conductivity of those that are used as conductors and those that are used as insulators, the former having many million times the conductivity of the latter. The substances at the lower end of the scale are therefore of sufficiently low conductivity to serve for covering and supporting wires made of the good conductors, without permitting any serious escape of an electric current when the wires are charged.

In transmitting electricity from point to point, through telegraph or electric-light lines, e.g., those substances possessing the greatest conductivity, such as copper and iron, are selected to form a path for the current, and these are surrounded with materials which have the least conductivity or offer the highest resistance, such as air, rubber, porcelain, and glass, in order to confine the current and compel it to travel to the end of the line. When a conductor is so surrounded or so placed on nonconducting supports that it prevents the electricity communicated to it from passing into the ground or escaping, it is said to be insulated.

As the difference between conductors and insulators is merely one of degree, there is, even under the best conditions, a loss in the transmission of electricity over a line of wire proportionate to the amount of leakage through the insulation and the resistance to travel offered by the wire itself, since the slight effort required of the current to force its way ahead through the wire causes some of it to escape through the insulation in the same way that water forced through a long pipe will escape in small quantities at weak points. It is, indeed, extremely necessary to prevent conductors buried in the earth from having any connection with water or dampness, and, if the insulation of the conductor is defective in a damp spot, a certain proportion of the current will leave the conductor and travel through the earth. Chemically pure water is a nonconductor, but, as found in the earth, water is an excellent conductor on account of the materials it holds in solution.

The electrical conductivity and its reverse, the resistance of materials, are, therefore, subjects of great importance to electricians; and the selection of materials of high conductivity or low resistance for wires, and materials of high resistance for insulators, receives careful attention. The best conductors are gold, copper, silver, aluminum, brass, iron, and all other metals. The best insulators, or the worst conductors, are dry air, glass, mica, porcelain, paraffin, rubber, silk, gutta-percha, and almost all the hydrocarbons. The intermediate substances are many liquids and damp substances, carbons, minerals, and compound substances. The conductivity of all substances is greatly affected by changes of temperature. An increase of temperature increases the resistance of all the metals, while it has the opposite effect in other substances. Glass loses its insulating properties at a red heat, and so do wax, sulphur, amber, and shellac when fused.

Glass, if not the most perfect insulator, far exceeds others in hardness and durability and is much employed as insulation for light electrical apparatus. Hard rubber or vulcanite enters into the construction of much electrical apparatus on account of its high resistance. Paraffined paper is also employed for condensers (q.v.), while for the armatures of dynamos and motors mica is used. See ELECTRICITY.

CONE (Lat. *conus*, Gk. *κῶνος*, *kōnos*, cone, Skt. *śāna*, whetstone, from *śā*, to sharpen). A solid formed by a conical surface and a plane cutting all of the elements of this conical surface. A conical surface is generated by a line called the generatrix passing through a fixed point and tracing a fixed curve called the directrix. If the line is unlimited, it generates two conical surfaces, on opposite sides of the point (vertex), called the "nappes" of the cone. A cone whose base is a circle is called a "circular cone." If the vertex is on a line perpendicular to the base of a circular cone, through its centre, the cone is called a "right circular cone." A right circular cone may be generated by rotating a right-angled triangle about one of its perpendicular sides. The line from the vertex to the centre of the base is called the "axis." If the axis makes with the base an angle other than 90°, the cone is called "oblique." If a plane cuts a cone between the vertex and the base, the cone is said to be "truncated"; if the cutting plane is parallel to the base, the lower part is called a "frustum" of the cone, the section made by the cutting plane being called the "upper base." Three curves, called "conic sections" (q.v.), may be formed by planes cutting a right circular cone at various angles to the base. The mensuration of the cone was well known to the Greek geometers, the subject being most carefully studied by Archimedes (q.v.).

CONE, HUTCHINSON INGHAM (1871–). An American naval officer, born in Brooklyn, N. Y. He was brought up in Florida and graduated at the Florida Agricultural College in 1889 and at the United States Naval Academy (Annapolis) in 1894. He served on the *Baltimore* at Manila in the Spanish-American War, commanded a flotilla of torpedo boats from Hampton Roads to San Francisco in 1908, was fleet engineer in 1908–09 of the Atlantic Fleet in its trip around the world, and in 1909 became head of the important Bureau of Steam Engineering with rank of rear admiral. He contributed to periodicals articles on such subjects as machinery and fuels for naval vessels.

CONE, IN BOTANY. See CONIFERÆ.

CONE, ORELLO (1835–1905). An American theologian and author, born at Linclean, N. Y. He was educated at St. Paul's College, Mo., was professor of biblical languages and literature at St. Lawrence University from 1866 to 1880, and president of Buchtel College in 1880–96. In 1900 he returned to St. Lawrence University to take the chair of biblical theology. He edited the *International Handbooks of the New Testament*, and published: *Gospel Criticism and Historical Christianity* (1891); *The Gospel and its Earliest Interpretations* (1893); the particularly valuable *Paul, the Man, the Missionary, and the Teacher* (1898); and *Rich and Poor in the New Testament* (1902).

CONE, SPENCER HOUGHTON (1785–1855). An American Baptist clergyman, born at Princeton, N. J. He studied for two years (1797–99) at Princeton; was at first an instructor in private schools in Burlington, N. J., and Philadelphia, Pa.; and later became an actor, and played in Philadelphia and other cities with success for seven years (1805-12). He accepted a clerical position on the Baltimore *American* in 1812, and became publisher of the Baltimore *Whig*. In 1814, upon his removal to Washington, D. C., to be a Treasury clerk, he became a Baptist minister. In 1815 and 1816 he was chaplain to the House of Representatives, and in 1823 was called to the Oliver Street Baptist Church, New York City. In 1841 he took charge of the Broome Street Church, where he remained during the remainder of his life. From 1832 to 1841 he was president of the Baptist Triennial Convention for the United States. He was president of the American Bible Union from its formation to his death, and from 1837 until 1850 he was president of the American and Foreign Bible Society.

CONE FISH (so called from its shape). A small, somewhat globular sea fish (*Monocentris japonicus*) of the family Berycidæ, dwelling on the coasts of China, Japan, and the Philippines, and called by the Japanese "matskasa," or pine-cone fish. It is about 5 inches long, and the body is covered with large scales in appearance like a coat of mail carelessly put together. See Colored Plate of PHILIPPINE FISHES.

CONEGLIANO, kō'nâ-lyä'nō. A city in the Province of Treviso, northern Italy, situated on the stream of Monticano, 35 miles north of Venice (Map: Italy, G 2). It is commanded by a huge castle and has a cathedral containing a fine altarpiece by Cima (1492), a native of Conegliano. In the Loggia Municipale are monuments to Dante, Victor Emmanuel, Garibaldi, and the victims of the War of Liberation. The town is noted for its wine. It also engages in silk spinning and has a technical and a wine-making school. In 1808 Marshal Moncey was named Duke of Conegliano by Napoleon. Pop. (commune), 1881, 8938; 1901, 9796; 1911, 13,007.

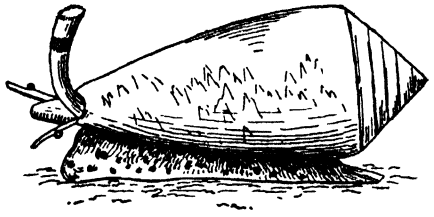
CONEGLIANO, DA. See CIMA, GIOVANNI BATTISTA.

CONEGLIANO, DUKE OF. See MONCEY.

CONE-NOSE, or KISSING BUG. A bug of the predatory family Reduviidæ; specifically *Conorhinus sanguisugus*, called "giant bedbug" in the southern United States, where it is a pest in houses. It is three-quarters of an inch long, black with red patches, or spots, on the sides of the thorax, at the base and apex of the wing covers, and bands on the sides of the abdomen. The young much resemble large bedbugs (to which they are allied), and all ages are fierce biters and bloodsuckers, preying upon insects and flying into houses at night and attacking sleeping persons and animals. The kissing bug seems to breed in the nests of mice and is prevalent from the central Mississippi valley to the tropics. The name "assassin bugs" has been given to the whole family by Comstock, because of their cannibalism and rapacity; and to certain species, especially *Melanolestes picipes* and *Reduvius personatus*, which were especially abundant in the Eastern States during the summer of 1898, was due the "kissing-bug" excitement, busily fostered by the newspapers. Of the two "kissing bugs" above mentioned, the latter, according to Howard, is a cosmopolitan form which, in the Northern States, is found in basements and cellars of dirty houses and preys upon bedbugs and cockroaches. When immature, it covers itself with dust and presents a very odd appearance. The "thread-legged" bugs of the family Emesidæ, which rob spiders of their prey, are near relatives. Consult "Insects to which the Name 'Kissing-bug' Became Applied during the Summer of 1899," in *Bulletin, United States Department of Agriculture, Division of Entomology*, N. S. 22 (Washington, D. C., 1900).

CONEPATE, kō'nâ-pä'tâ (Nahuatl *nepatla*, subterranean dwelling). The name in Mexico of the large white-backed skunk (*Conepatus mapurito*), called in South America "mapurito." See SKUNK.

CONE SHELL. The popular name of a genus (*Conus*) and family (Conidæ) of gastropod mollusks, of the order Streptoneura, having a shell of remarkably regular conical form; the spire on the base of the cone, and sometimes rising from it to a sharp point, sometimes almost flat; the aperture narrow and straight, without protuberance or fold, extending from the base of the cone to its apex. The head of the animal has a proboscis capable of much extension; the mantle is scanty and narrow, forming an elongated siphon in front; the shell is covered with an epidermis. These mollusks are carnivorous; they inhabit shores and banks of sandy mud, chiefly



A CONE (WALKING TOWARDS THE LEFT).

The siphon is protruded and held upright, and the eyes are seen on the tentacular eyestalks springing from the head.

within the tropics, a few only occurring in the Mediterranean. The shells of many species are very beautiful and much prized by collectors. Cone shells first appear in Cretaceous rocks and become more abundant in later formations.

The young cone shells are elongated and have high spires, which in the adults are more or less completely shortened through envelopment by the outer whorls. These elongated spires are also characteristic of the adult stages of the early ancestors of the cones, of Cretaceous and Tertiary time, especially of the genus *Conorbis*, of the Eocene. The genus *Conus* has some doubtful representatives in the Cretaceous, about 150

species in the Tertiary, in the rocks of which age it is common and beautifully preserved, and it is at present approaching the maximum of its evolution. See Colored Plates of MARINE GASTROPODS.

CONES'SI BARK. See WRIGHTIA.

CON'ESTO'GA (Iroquois). Formerly an important tribe of the Iroquoian stock, occupying the country on the lower Susquehanna and about the head of Chesapeake Bay in Pennsylvania and Maryland, and claiming dominion over several smaller tribes on both sides of the bay. The name is said to mean 'people of the forked roof poles.' The French called them "Andastes," while to the Virginia tribes and the Southern colonists they were known as "Susquehannas." They lived in palisaded villages, and when first known were a powerful people, bidding defiance to the invading Iroquois, by whom, however, they were at last overcome about 1675. A part fled south through Virginia and took refuge in North Carolina, under the name of "Meherrin." Others were deported to the Iroquois country, whence they were afterward allowed to return, and settled at Conestoga, near Lancaster, Pa. Here they rapidly wasted away, until 1763, when the few that remained were massacred by a mob during the excitement provoked by the Indian wars.

CONEY, kō'nĭ *or* kūn'ĭ (OF. *conin*, Lat. *cuniculus*, Gk. *κόνικλος*, *koniklos*, or *κύνικλος*, *kyniklos*, rabbit; of Iberian origin). The old English name for the rabbit, used in the Bible as the translation of the Hebrew word *shaphen*, the local name for the Syrian hyrax, or daman (see HYRAX), and since applied to other mammals which superficially resemble either Lepus or Hyrax. The pika (q.v.) is known to hunters and miners in the western United States as the "coney," though it looks more like a guinea pig than a rabbit. In Jamaica the hutia (q.v.) is generally called the "Indian coney."

CONEY ISLAND. An island, included in the Borough of Brooklyn, New York City, and the most popular seaside resort in the vicinity of the metropolis; situated off the south shore of Long Island, 9 miles southeast of the Battery (Map: Greater New York, G 12). It is nearly 5 miles long, and from a few hundred feet to three-fourths of a mile wide, and is separated from the mainland by Coney Island Creek, a narrow tidal inlet, Gravesend Bay, and Sheepshead Bay. For a long period it was considered comparatively worthless; but as soon as its fine beach became recognized as a safe place for bathing, and regular communication by boat and railroad was established, the sporadic bathhouses and cheap hotels were replaced by more permanent structures, and its growth has been extraordinary. It is now reached by steamboat service from Manhattan, by the Long Island Railroad, and by various trolley lines and elevated roads. There are several sharply differentiated districts. West Brighton is the centre for the mass of visitors and for the cheaper amusements and embraces the district usually referred to by the name "Coney Island." About three-quarters of a mile to the east is Brighton Beach, where there are a large hotel, a theatre, and the Brighton Beach Race Track, while still farther to the east is Manhattan Beach, which extends to the end of the island. Here are a large hotel, baths, and a residential district under development. At the western end of the island is the select residential district called "Sea Gate," the fine clubhouse of the Atlantic Yacht Club, and a lighthouse on Norton's Point.

CONFAR'REA'TION (Lat. *confarreatio*, from *confarreare*, to marry by an offering of spelt, from *com-*, together + *farreus*, made of spelt, from *far*, spelt; connected with OChurch Slav. *bŭrŭ*, AS. *bere*, Eng. *barley*). A form of celebrating marriage, of peculiar solemnity and of great antiquity, among the Romans. It was a customary form, originally restricted by law to the patricians, among whom it originated. It retained its superior sanctity and validity long after it had been extended to the plebeians, and after simpler and less conventional forms of marriage had come to be recognized. Its specialty consisted in the employment of certain words in the presence of witnesses, and in the performance of a religious ceremony in which *panis farreus* (bread made of spelt) was used. Many of the high offices of state, especially such as were of a priestly character, were open only to those who were born of parents thus married. See MARRIAGE.

CONFEC'TIONERY (from ML. *confectionarius*, confectioner, from Lat. *confectio*, preparation, from *conficere*, to make up, from *com-*, together + *facere*, to make). Preparations of sugar, or of material of which sugar is the principal ingredient, with the addition of attractive colors, flavoring extracts, nuts, fruits, and sometimes fat, starch, glucose, and gelatine, used as sweetmeats.

Where confectionery is pure its use in reasonable quantities involves no danger to health, as sugar is required as a food element, especially in processes of growth and for its antiseptic and other properties. Unfortunately a certain proportion of the cheaper kinds of candy are adulterated and colored with poisonous ingredients. The common adulterants used are terra alba, kaolin, and other mineral substances intended to give weight and volume to the mass, but national and State laws are endeavoring to restrict such practices. Most organic coloring materials used in candy making are harmless, but neither mineral colors nor coal-tar dyes should be used. The best flavors are true fruit extracts, essential oils like peppermint, etc. Artificial flavors are inferior and undesirable.

Until the beginning of the nineteenth century the art of making sweetmeats was practiced chiefly by physicians and apothecaries, who used sugar and honey to conceal the taste of their medicines. Medicated candies are still largely made by drug manufacturers, and such drugs as sulphate of quinine are not infrequently seen with chocolate coatings. During the earlier half of the nineteenth century the art of candy making was an English specialty. In 1851 an international exhibition was held in London, and the unique collection of candies there exhibited attracted to this industry the attention of other nations, especially Germany and France. The latter soon excelled all other countries in the art of making chocolate bonbons and still maintains its supremacy, which perhaps might be disputed in America. In the United States, as early as 1816, there were 20 candy factories in the city of Philadelphia and probably as many more in New York. The candy manufacture of the State of New York in the census year 1840 was valued at $386,142, and in Pennsylvania the product amounted to $227,050. In the next 10 years, with the introduction of machinery, the growth was most rapid. Previous to 1845 each

candy dealer made his own goods by hand, the assortment being limited to stick and molasses candy and sugarplums and a few imported fancy candies. In 1845 the first machinery, in the form of a revolving steam pan, was introduced by Sebastian Chauveau, of Philadelphia, and the following year a lozenge-making machine was invented by Oliver R. Chase, of Boston, and put into operation in his candy factory. Since that time new forms of machinery have constantly been added to such an extent that the manufacture of candy forms a separate and important industry which has undergone extensive development. A machine for printing on candies was invented by Daniel G. Chase in 1866, which produced the so-called "conversation lozenges." The increased consumption of chocolate soon led to its use combined with sugar and other materials in confections that were widely demanded.

The growth of the confectionery industry in the United States as represented by the large factories has been very great. In addition, an enormous amount of candy is made every year by small establishments from which statistics are not obtainable, and it is noteworthy that many small manufacturers through the excellence of their product are often able to build up a reputation and profitable business in a few years. In 1850 there were in the United States 383 large factories, employing 1733 hands and producing $3,040,671 worth of goods. In 1900 the number of large factories was 4297, with an invested capital of over $35,000,000; 33,583 persons were employed, and the value of the product was $81,290,543. In 1909 the United States Census of Manufactures reported the product of 1944 establishments, 12 of which produced each over $1,000,000 worth of candy, as valued at $134,795,913, with an invested capital of $68,326,471. The industry gave employment to 44,638 wage earners. This was independent of the chocolate industry (see CHOCOLATE), with which confectionery is closely allied.

In 1884 the National Confectioners' Association of the United States was organized. It includes the leading manufacturers of the country; and one of its purposes is "to advance the standard of confectionery in all practicable ways and absolutely to prevent harmful adulterations." In most States the sale of candy containing harmful or poisonous ingredients is forbidden by law and many local pure-food laws and ordinances take cognizance of such practices, especially where school children are likely to be affected.

Bibliography. Consult Neil, *Candies and Bonbons and How to Make Them* (Philadelphia, 1913); Grillen, *Modern Practical Gum Work Manual* (New York, 1911); François, *Les aliments sucrés industriels*, with bibliography (Paris, 1912).

CONFEDERACY, THE. A comedy by Vanbrugh (1705), said to have been adapted from Dancourt's *Bourgeois à la mode.*

CONFEDERACY, UNITED DAUGHTERS OF THE. A woman's patriotic society organized in Nashville, Tenn., in 1894, for the preservation of the memory of Southern devotion and suffering during the Civil War. The society admits to membership the direct female relatives and lineal female descendants of those who served honorably in the Confederate service, or who in some other direct way aided the Confederacy. The organization is subdivided into local chapters, of which there were, in 1914, 1380 in the Southern States and elsewhere. These are governed by State divisions, which in turn are controlled by a general organization. Annual reunions are held, usually in November. The membership in 1914 was over 80,000.

CONFEDERATE STATES OF AMERICA. The name adopted by the federation of those 11 commonwealths of the United States of America which seceded from the Union in 1861 and were arrayed against the national government during the Civil War (q.v.). None of the theories of "State sovereignty" was inconsistent with membership in a properly federated union, and even the extreme advocates of those views recognized the advantages of the essential features of the existing system of national government. Thus, the convention of South Carolina, at the time of the adoption of its ordinance of secession, Dec. 20, 1860, expressed a strong desire for the early formation of a new confederation by the States at that time contemplating secession. Three weeks later the convention of Mississippi, at a time, as Davis wrote, "when the last hope of preserving the Union of the Constitution was extinguished," indorsed this proposal, as did also the convention in Florida on Jan. 10, 1861. On the following day the convention of Alabama made the proposition more specific by inviting the other Southern States to send delegates to a convention to be held at Montgomery, Ala., on February 4, in order that they might consult "as to the most effectual mode of securing concerted and harmonious action in whatever measures may be deemed most desirable for the common peace and security." Similar action was taken by the convention of Georgia, on January 19, and by that of Louisiana, on January 25, with the result that at Montgomery on the appointed day there gathered delegates from these six States, who organized as a provisional Congress of the Confederacy. By this body for one year, and thereafter by the more representative bicameral body which succeeded it, were directed the affairs of the new confederation, these bodies undertaking quite as complete an exercise of the more essential functions of a national government as had hitherto been undertaken by the old national Congress. Technical objections were dispelled by the exigencies of the situation, and the Congress was recognized as actually possessing, and as entitled to exercise, the powers of general government throughout the States then and thereafter represented in its membership. The authority and influence thus acquired was enhanced by the presence in its sessions not only of many men who had rendered efficient service in a similar capacity at Washington, but also of men who were at the time recognized as leaders of Southern thought and action, such as Wigfall of Texas, ex-President Tyler, Roger A. Pryor, and James M. Mason, of Virginia; Rhett and Barnwell, of South Carolina; Campbell, of Mississippi; Toombs, Cobb, and Stephens, of Georgia; and McRae and Curry, of Alabama. In the first instance the Congress, as originally organized, was particularly a constituent body, and among its first acts was the adoption, on February 8, in behalf of the six States represented, of a temporary constitution of government, to have force for "one year from the inauguration of the President, or until a permanent constitution or confederation between the said States shall be put in operation, whichsoever shall first occur." The convention, however,

went further and assumed to act as the legislative body of this new government, on the following day enacting that all laws of the United States in force in the Confederate States on Nov. 1, 1860, and not inconsistent with the constitution of the Confederacy, should be continued in force until repealed or altered by the Confederate Congress. To the same end provision was made for the continuance in office, at least for a time, of all administrative officials, and in order to hasten the detailed organization of the new national government, the more important congressional committees, upon war, finance, and foreign affairs, were forthwith appointed. The provisional Congress furthermore assumed the function of naming the chief executive officers, and on February 9 chose, as provisional President of the Confederacy, Jefferson Davis (q.v.), of Mississippi, and as provisional Vice President, Alexander H. Stephens (q.v.), of Georgia. Mr. Davis had already been appointed to the chief command of the Mississippi troops, and, although seeming strongly to prefer the military service, he relinquished his plans and undertook promptly the duties of the civil office which had come to him thus unsolicited, and in which he was to become recognized as the leader of the Confederacy. His first important act as President, the choice of a cabinet, was controlled rather unduly by political and geographical considerations. Each of the States represented, except that which secured the presidency, was allotted a cabinet officer, as was also Texas, which at that time was practically, although not formally, in the control of the Secessionists. The result was a group of high officials, among whom only two were recognized as men of especial ability—the noted Robert Toombs (q.v.), of Georgia, who became Secretary of State, and Judah P. Benjamin (q.v.), of Louisiana, a man of considerable repute as a barrister, who became Attorney-General. The executive departments were promptly organized, although the activity of some, particularly that of the navy, soon became limited, and the administration of public affairs proceeded thenceforth along lines familiar to Americans, and without unusual incident except such as naturally arose from the instability of the government, from the gradual overshadowing of the civil branches of government by the military, and from its final collapse.

The formal inauguration of Mr. Davis as President occurred on Feb. 18, 1861, when, in the course of his inaugural address, he said: "We have entered upon the career of independence, and it must be inflexibly pursued. Through many years of controversy with our late associates of the Northern States we have vainly endeavored to secure tranquillity and obtain respect for the rights to which we were entitled. As a necessity, not a choice, we have resorted to the remedy of separation, and henceforth our energies must be directed to the conduct of our own affairs, and the perpetuity of the Confederacy which we have formed. . . . With a constitution differing only from that of our fathers in so far as it is explanatory of their well-known intent, freed from sectional conflicts, which have interfered with the pursuit of the general welfare, it is not unreasonable to expect that States from which we have recently parted may seek to unite their fortunes to ours under the government which we have instituted. For this your constitution makes adequate provision; but beyond this, if I mistake not the judgment and will of the people, a reunion with the States from which we have separated is neither practicable nor desirable." The constitution of which President Davis thus spoke was intended only for temporary use, and the convention accordingly, on March 11, 1861, adopted and submitted to the various States for ratification, the permanent constitution of the Confederate States. In large measure this instrument was identical with the Constitution of the United States, although between the two there were natural divergences of theory as well as some differences of detail. Thus, the President was made ineligible for reëlection, and his term was fixed at six years; a qualified membership in Congress of cabinet officers was made possible; special prohibitive duties were forbidden; ordinary appropriations were made dependent upon a two-third vote in each house; and the President was empowered to veto specific portions of an appropriation bill, while approving other portions. Where opportunity offered, the phrases of the new constitution were so turned as to express the views of the Southern leaders as to sovereignty and as to the proper position of commonwealths in any union or federation. Thus it was specifically stated that each State was "acting in its sovereign and independent character," that legislative powers were "delegated" thereby, rather than "granted," and that citizens of one State might "sojourn" in another State with their slaves without losing any right of property therein." The new constitution was, as the New York *Herald* then said, "the Constitution of the United States with various modifications and some very important and most desirable improvements."

The provisional Congress also made provision for the formation of a permanent army of the Confederacy, proceeded early to establish various sources of public revenue, and promptly attempted to secure from foreign governments both material assistance and formal recognition. The character and work of the army thus organized formed possibly the most distinctive feature in the work of the Confederacy. (See CIVIL WAR.) The development of a system of public finance was hampered by the prevalent opposition to internal taxes, while the small quantities of dutiable goods imported made the customs duties an inappreciable element in the public revenue. To meet this exigency, special war taxes were levied, repeated issues of treasury notes were made, and very large amounts of bonds were authorized by the new government. Produce loans also were resorted to—the bulk of the subscriptions for which were made in cotton—and subsidies or loans to the central government were made by some of the States, so that the first year was passed with a semblance of financial stability. A considerable sum was realized from the placing of a foreign loan based on cotton, which loan was effected in the spring of 1863. With the increase of the bond issues, and especially with the abnormal expansion of the currency, prices were forced upward, credit became unsettled, the gold and silver in general circulation were driven out of the country by the enormous issues of paper money, and financial demoralization became pronounced towards the close of the war, when the price of a gold dollar was 60 times its price at the beginning of the war, when boots sold at $200 a pair, and when the price of coffee had increased nearly

200 times, on account of the scarcity produced by the blockade, and the price of cereals nearly 90 times. Normal business was thus completely deranged, while the rage for speculation and the spirit of gambling naturally pervaded the transactions of daily life. The action of the Confederate Congress in February, 1864, in passing a law requiring note holders to fund their notes before a certain date, after which notes would be taxed a third or more of their face value, practically wrecked the government's credit. In seeking to enlist the aid of foreign governments, the steps taken by the Confederacy early gave occasion for critical relations between England and the United States (see TRENT AFFAIR), and led also to serious diplomatic complications in the later years (see ALABAMA CLAIMS), although the efforts of this character were to a considerable degree successful, and at times reached such a point as to foreshadow foreign intervention, or at least recognition to an extent that would have made the success of the Confederacy, if not imminent, certainly far less improbable.

The early months of the Confederacy were marked, in addition to the rapid steps of organization and of preparation for conflict, by an effort at peaceable adjustment. In response to a call of the Virginia Legislature, a peace convention met at Washington in February, 1861, and delegates from seven slaveholding States, including Tyler and Rives of Virginia, Caruthers of Tennessee, and Clay of Kentucky, took part in its futile proceedings. During the following month there were active at Washington three formally appointed commissioners of the Confederate Congress—Messrs. Crawford of Georgia, Forsyth of Alabama, and Roman of Louisiana—who endeavored, largely through the mediation of Justice Campbell of the Supreme Court, to secure recognition and to arrange some reasonable basis of at least a temporary settlement, pending more formal negotiations. This effort also proved abortive through a misunderstanding, involving charges of breach of faith, as to the relief of Fort Sumter. With the withdrawal of these commissioners from Washington and the disappearance of any possibility of voluntary recognition by the Northern government, the position of the Confederacy was more clearly defined. Its strength, moreover, was increased by the secession of Virginia on April 17, of North Carolina on May 20, and of Tennessee on June 8, so that there were 11 States in the new union when its Congress met for its third session on July 20, 1861, at the new capital of the Confederacy, Richmond, Va. Upon the 6th of November were held the first general elections under the permanent constitution, resulting in the choice by a unanimous electoral vote of Davis as President, and Stephens as Vice President. The fourth and last session of the provisional Congress closed on Feb. 18, 1862, when the new Senate and House assembled, including in their membership such men as Clay and Yancey of Alabama, Hunter of Virginia, and Wigfall of Texas. Upon the 22d Davis was formally inaugurated as President for a term of six years, but the remaining years of his service were distinguished not so much by his administrative services as by the conflict between the civil and military elements, and by such controversies as that over the suspension of the writ of habeas corpus, the whole situation gradually becoming more and more abnormal, and being to some extent typified by the studied omission to provide for the creation of a supreme court. The course of the President in his official career provoked at the time much severe criticism and later occasioned a variety of comment. Of his election one recent writer says that "the choice was the best that could have been made," while another equally competent critic describes the situation as follows: "The strongest and most self-assertive spirit of the senatorial clique, having been chosen President, at once began to quarrel with his associates and to drive them from his counsels; there was no popular strength in the provisional Congress to resist him; and even before the inauguration of the permanent government the Confederacy had become a military despotism of the executive." Such a tendency was increased by the custom of holding secret sessions of Congress and by the practice of cabinet officers exercising their right to sit in Congress, as well as by the gradual lowering of the political morale and independence of that body. This unfortunate condition of affairs was further complicated by personal controversies among officials, both civil and military, in the highest stations, so that the later months of the administration of the Confederacy were such as to indicate the approach either of internal crisis or of complete dissolution, and such as to make the collapse of the government, on the fall of its capital, a natural and inevitable event. The first Congress under the permanent constitution had held four sessions, and the second Congress had held two sessions, the final adjournment of the body having been taken on March 18, 1865. The cabinet officials who served the Confederacy were as follows: Secretary of State, Robert Toombs, of Georgia, Feb. 21, 1861; R. M. T. Hunter, of Virginia, July 30, 1861; Judah P. Benjamin, of Louisiana, Feb. 7, 1862. Secretary of the Treasury, Charles G. Memminger, of South Carolina, Feb. 21, 1861; George A. Trenholm, of South Carolina, June 13, 1864. Secretary of War, L. P. Walker, of Alabama, Feb. 21, 1861; Judah P. Benjamin, of Louisiana, Nov. 10, 1861; G. W. Randolph, of Virginia, March 17, 1862; James A. Seddon, of Virginia, March 22, 1862; John C. Breckenridge, of Kentucky, Feb. 15, 1865. Secretary of the Navy, Stephen R. Mallory, of Florida, March 4, 1861. Attorney-General, Judah P. Benjamin, of Louisiana, Feb. 21, 1861; Thomas H. Watts, of Alabama, Sept. 10, 1861; George Davis, of North Carolina, Nov. 10, 1863. Postmaster-General, John H. Reagan, of Texas, March 6, 1861.

While the political organization of the Southern Confederacy was thus almost identical with that prevailing at the North, the outbreak of the war served to accentuate in important respects the marked difference between the two sections, particularly in those features which were of especial importance in time of war. Not only did the population of the Union States exceed that of the seceding States in the proportion of five to two, but the discrepancy was even greater in material resources. In general wealth, in foreign commerce, in internal improvements, and in manufactures, especially of fabrics and of *matériel* of war, the North was vastly superior to the South. Thus, the value of the improved lands of the seceding States was estimated at less than $2,000,000,000, while the value of those in the Union States was nearly $5,000,000,000. In the South were 150 fabric factories, with a product valued at $8,000,000,

while in the North there were 900 such factories, with a product valued at $115,000,000. In the South some 2000 persons were employed in the manufacture of clothing, while in the North 100,000 persons were so engaged. During the year 1860 the imports of the South were valued at $31,000,000, and those of the North at $331,000,000. It was thus apparent that the South was "dependent on Europe and on the North for everything but bread and meat." The South, indeed, seemed fairly supplied with foodstuffs, but the destruction of the crops by the advancing Northern armies, the lack of transportation facilities, and the paper-money policy with its attendant repressive measures, brought it about that at the end of 1864 there was a "general distress for food" and "an actual prospect," as a leading Southerner stated it, "of starving the Confederacy into submission." In addition to these serious obstacles to success, the South was seriously embarrassed by the lack of powder mills and of suitable ironworks. Only one plant, the Tredegar Iron Works at Richmond, was capable of turning out the larger types of field guns, and it was not until the close of the war that operations were well under way for equipping the South with suitable ammunition and arms plants. Its railway system was poorly developed, and the railways inadequately equipped. Moreover, such minor supplies as leather were very limited and at times quite unavailable, and throughout all branches of activity were apparent the very unusual difficulties under which the Confederacy was obliged to carry on its work of administration and of warfare. The conditions prevailing at the end of such a struggle and the results of the termination of such a conflict appeared more tangibly in the following years of Reconstruction, where the energies of the defeated were directed towards the economic regeneration of the South as well as to its political reorganization. Suffice it to say, the desperate efforts made by the South to maintain itself in a struggle against overwhelming odds left that section, at the close of the War, a complete wreck financially and industrially. See also SLAVERY and RECONSTRUCTION, and the articles on the various States mentioned.

Bibliography. Important works by Southerners are: J. Davis, *Rise and Fall of the Confederate Government* (2 vols., New York, 1881); A. H. Stephens, *Constitutional View of the War between the States* (2 vols., Philadelphia, 1870); and the several works of E. A. Pollard, especially his *Lost Cause* (New York, 1867). There is a short bibliography in A. B. Hart, *Guide to American History*, sec. 209 (Boston, 1890), and a paper, "Materials for the History of the Government of the Southern Confederacy," in the *American Historical Society Papers* (New York, 1890). A recent and valuable work on financial and industrial matters, by J. C. Schwab, is *The Confederate States of America* (New York, 1901; contains a full bibliography). Consult also: J. D. Bulloch, *The Secret Service of the Confederate States in Europe* (New York, 1884); Callahan, *Diplomatic History of the Southern Confederacy* (Baltimore, 1901); J. L. M. Curry, *Civil History of the Government of the Confederate States* (Richmond, 1901).

CONFEDERATE VETERANS, UNITED. A patriotic society organized in New Orleans, La., in 1889. Its objects are to unite in a general federation all associations of Confederate veterans now or hereafter in existence; to gather authentic data for an impartial history of the war between the States; to preserve relics and mementos; to cherish the ties of war friendships; to aid veterans and their widows and orphans; and to keep alive the memory of the dead. Membership is extended to all surviving soldiers or sailors of the Confederate service. The local organizations called camps, in 1914, were about 1170 in number, and were organized in three departments, as follows: the Army of Northern Virginia Department; the Army of Tennessee Department; and the Trans-Mississippi Department. The badge worn on the lapel of the coat is a square miniature Confederate flag. Membership in 1914 was about 55,000. The *Confederate Veteran*, Nashville, Tenn., is the official organ.

CONFEDERATE VETERANS, UNITED SONS OF. A patriotic society organized in Richmond, Va., in 1896. Its objects include: the cultivation of friendships among its members; the encouragement of the writing of war incidents; the collection of original data for an impartial history of the Confederate side; the preservation of relics and mementos; the perpetuation of an accurate record of the services of every Confederate veteran; the support of pensions, soldiers' homes, and other agencies for the relief of needy Confederate survivors, their widows and orphans; and the erection of monuments and memorials. Membership is restricted to male descendants of Confederate soldiers or sailors who served "to the end of the war, or who died in prison or while in actual service, or who were killed in battle, or who were honorably retired or discharged." The unit of organization is the camp, which consists of: subdivisions of States (brigades); State organizations (divisions); and groups of State divisions (departments), viz., Army of Northern Virginia Department; Army of Tennessee Department; and the Trans-Mississippi Department. Annual reunions are held. The publications consist of the minutes of its conventions, copies of the constitution, separate reprints of the reports of the historical committee, etc. The membership in 1914 was about 50,000. The Mississippi Division in 1902 purchased Beauvoir, the home of Jefferson Davis, and turned it over to the State for use as a soldiers' home.

CONFED'ERA'TION (Lat. *confœderatio*, from *confœderare*, to unite in a league, from *com-*, together + *fœderare*, to make a league, from *fœdus*, league; connected with Lat. *fides*, faith, from *fidere*, to believe, Gk. *πειθειν*, *peithein*, to persuade, Goth. *bidjan*, OHG. *bittan*, Ger. *bitten*, to request, AS. *biddan*, Eng. *bid*). An alliance of nations, states, or princes, according to Woolsey (*Introduction to International Law*, sec. 104), a union more or less complete of two or more formerly independent states. The New England Confederation (1643–84) is the earliest example of confederation in America. In 1777 the Continental Congress adopted the Articles of Confederation, setting forth the great principles of government which, with such additions as were necessary "in order to form a more perfect union," were later embodied in the Constitution of the United States. Most of the Latin-American republics have come into being on a basis of confederation. In 1815 the German Confederation was formed to replace the Holy Roman Empire, which confederation had been dissolved in 1806. The North German Confederation (1866–70) preceded the estab-

lishment of the German Empire, by whose original constitution all the states of Germany "form an eternal union for the protection of the realm and the care of the welfare of the German people." The Swiss Confederation, comprising at present 22 autonomous cantons, had its origin in 1291 in the union of the cantons of Uri, Schwyz, and Lower Unterwalden.

CONFEDERATION, ARTICLES OF. See UNITED STATES.

CONFEDERATION, GERMAN. See GERMANY.

CONFEDERATION OF THE RHINE. A league of German princes formed in 1806 under the protection of Napoleon. The first to seek the French alliance were the Electors of Bavaria and Württemberg, who, in recompense for their services, were elevated to the dignity of kings by the Peace of Presburg, Dec. 26, 1805. At Paris on July 12, 1806, 16 German princes formally signed an act of confederation, dissolving their connection with the German Empire and allying themselves with France. These princes were the Kings of Bavaria and Württemberg, the Arch-Chancellor Dalberg, the Elector of Baden, the Duke of Cleves and Berg (Joachim Murat), the Landgrave of Hesse-Darmstadt, the Princes of Nassau-Usingen, Nassau-Weilburg, Hohenzollern-Hechingen, Hohenzollern-Sigmaringen, Salm-Salm and Salm-Kyrburg, the Duke of Arenberg, the Princes of Isenburg-Birstein and Liechtenstein, and the Count of Leyen. The princes justified their conduct by enumerating the vices of the constitution of the German Empire, promised to aid Napoleon in his wars with an army of 63,000 men, and called upon the other princes of Germany to imitate their example. The Arch-Chancellor Dalberg was made Prince Primate of the confederation, with his seat at Frankfort. During the years 1806–08 other German sovereigns enrolled themselves as members of the confederation, and at the close of 1808 it embraced a territory of 122,236 square miles, contained a population of 14,608,877 souls, and kept up an army of 119,180 men. The disasters which overtook the French army in the Russian campaign acted like a solvent on the confederation, and it vanished in 1813, not, however, to be returned to its original princes, but to be delivered, by the foolish diplomacy of Talleyrand (q.v.), to Prussia. Consult: Rambaud, *La domination française en Allemagne, 1804–11* (Paris, 1876); Seeley, *Life of Stein* (3 vols., Cambridge, 1878); and the general histories of Ranke, Pertz, Oncken, and Treitschke. See GERMANY.

CONFERENCE (ML. *conferentia*, from Lat. *conferre*, to carry together, from *com-*, together + *ferre*, to bear). The assemblage of persons gathered for the purposes of consulting upon any course. There have been many international conferences, such as those of Geneva in 1864, of London in 1864, 1867, and 1871, of The Hague, 1899, and the Balkan Conference at London in 1912–13. An ecclesiastical conference was held at Hampton Court Palace, at the instance of James I, in 1604. It was composed of prelates of the Church of England and dissenting ministers, the object being to establish a scheme of "comprehension" or common creed. This conference led to the translation of the Bible known to English readers as the Authorized Version. Another conference was held in 1661, the Savoy House Conference, when some alterations were made in the Prayer Book. Similar conferences were once frequent in the Roman Catholic church, and in other churches there are pastoral and other conferences. The annual meeting of the Wesleyan Church of England is called the "Annual Conference"; and the title is used for annual or other stated sessions in the Methodist Episcopal, the Evangelical, and some Baptist denominations. Under the name of "Evangelical Church Conference," delegates from the Reformed churches in the German states and Austria meet for the consideration of questions affecting church matters.

CONFERVA (Lat., a kind of water plant, from *confervere*, heat, from *com-*, together + *fervere*, to be hot). A general term sometimes applied to certain simple filamentous green algæ. Also the name of a genus of the Chlorophyceæ (q.v.).

CONFESSIO AMANTIS (Lat., The Lover's Confession). A long poem of over 30,000 lines by John Gower (1393). It is a conversation between Genius, the representative of Venus, and a lover, in which a series of tales, illustrating the effects of the various vices, is introduced.

CONFESSION. In the theology of the Church, Eastern and Western, an acknowledgment of sins to God in the presence of a priest in order to obtain absolution. The practice of confession is taught by the Church to be of divine institution, being a part of that sacramental system which extends the benefits of the Incarnation and Atonement in the scheme of redemption to individual souls. It is explicitly mentioned in the New Testament (Matt. xvi. 19; xviii. 18; John xx. 22, 23; 2 Cor. v. 17–21) and is specifically included in the power of binding and loosing from sin conferred on the Apostles and transmitted to their successors. No formal scriptural precept is alleged for it, but it is contended that sufficient witness to its explicit use and value is contained in the practice and discipline of the Christian Church from early times and in the passages above cited. Though the Apostle James recommends that Christians should confess their "faults one to another," yet open and public confession appears to have been required in cases where persons guilty of gross apostasy desired to be reinstated in their full relationship to the Church. Open or public confession, which was part of the discipline of public penance, ceased when that discipline went into disuse. Private confession has been retained, and its defenders hold it to have been at all times in use. A general law for the Western Church was enacted by the fourth council of the Lateran in 1215 (can. xxi, *omnis utriusque sexus*) requiring that every Christian who has attained the years of discretion should confess to a priest approved for the purpose, at least once in the year. Confession is one of the three "acts of the penitent"—contrition, confession, and satisfaction—which the Council of Trent declares to be parts of the sacrament of penance. The sinner is required to confess each and every mortal sin, in thought, word, and deed, which, after diligent examination of his conscience, has occurred to his memory. To conceal one deliberately vitiates the confession, since the soul cannot be restored to the friendship of God while consciously unrepentent of any sin. He is exhorted, but not required, also to confess venial sins (q.v.), especially if they be habitual. Confession, in order to be fruitful, must be accompanied by contrition and a purpose of amendment. It commonly embraces the sins committed since the

last confession, but may include a longer period and even the entire life. In the latter case the confession is called general. It is called "auricular," as being made to the private "ear" of the priest, and is ordinarily spoken, but in cases of necessity may be made in writing, by signs, or by an interpreter. Priests cannot validly, except *in extremis*, receive confessions in any place without the "approbation" of the bishop of the place, which may be given absolutely or with restrictions. Confession is prescribed in the ritual of the Greek, the Russo-Greek, the Coptic, the Syrian, and the other Oriental churches. In most of these churches the practice is obligatory, but in some it has gone into disuse. The Lutheran church professes (according to the eleventh article of the Augsburg Confession) "that private confession must be retained in the Church; but that full and particular statement of *all* sins is not necessary, because, according to Ps. xix. 12, it is impossible." In the Apology of the Augsburg Confession it is said to be "impious" to abolish the practice of private confession to the priest; but in practice the Lutheran church has widely departed from these rules. The Reformed church in Germany has always been more inclined to general confession, and the United church also substitutes for private confession certain devotional exercises previous to communion. The Church of England has retained the general doctrine of the Western Church on confession. In the Morning and Evening Prayer in the Book of Common Prayer and in the Communion Office general forms of confession and absolution are retained which latter explicitly states that Christ "hath given power and commandment to His Ministers to declare and pronounce to His people being penitent the Absolution and Remission of their sins." Private confession is provided for in the office for the visitation of the sick, and in one of the exhortations in the Communion Office people are invited to come to receive the "benefit of absolution." The American Prayer Book does not contain the provision in the visitation of the sick, but makes provision in the visitation of prisoners for a "particular confession." No office is set forth because it does not lie in the scope of common prayer. See ABSOLUTION; PENANCE; CONTRITION. Consult Lea, *A History of Auricular Confession and Indulgences in the Latin Church* (Philadelphia, 1896). Casey, *Notes on a History of Auricular Confession* (Philadelphia, 1899), is a Catholic criticism on Lea's work. For the Church of England, see Carter, *The Doctrine of Confession in the Church of England* (London, 1885).

The *sigillum confessionis* ('seal of confession') means the obligation of a confessor or priest not to divulge the secrets of the confessional. This custom of secrecy is traceable in the fourth and fifth centuries, but was made binding by Innocent III (1198–1216), and its violation by a priest makes him subject to the severest penalties that can be inflicted by the Church. See PRIVILEGED COMMUNICATION.

CONFESSION (Lat. *confessio*, from *confiteri*, to confess, from *com-*, together + *fateri*, to acknowledge; connected with *fari*, Gk. *φῆναι*, *phēnai*, to speak). In law, a purely voluntary declaration made by one who has committed a crime that he is guilty of the offense with which he is charged. If made before a magistrate or in the court of judicial proceedings before a court, such confessions are "judicial"; if made anywhere else, they are "extrajudicial." An entirely voluntary confession is admissible in evidence; but not so if procured through inducements, threats, promises, or hope of escape or favor. A prisoner's confession when the *corpus delicti*, i.e., the essential element of the crime, is not otherwise proved is not sufficient to warrant conviction. It is generally provided by statute that a confession in a capital case must be corroborated by evidence in order to justify a conviction. Whether an alleged confession is admissible, as having been made voluntarily, is a question for the court; what weight it is entitled to is a question for the jury. See ADMISSION; also CRIMINAL LAW, and consult the authorities referred to there.

CONFESSION (the tomb of a confessor or martyr). In church architecture, the recess, ambulatory, or chapel beneath the central altar, containing the relics of the saints, and corresponding to the subterranean tombs of the martyrs in the catacombs over which churches were erected. Such confessions gradually grew in size between the fourth and seventh centuries, until they developed into the crypt (q.v.).

CONFESSION, AUGSBURG. See AUGSBURG CONFESSION.

CONFES'SIONAL (ML. *confessionalis*, relating to confession, from Lat. *confessio*, confession). The seat, recess, or booth in which the priest sits to hear confession in a Roman Catholic church. These booths are distributed throughout the interiors of churches, in the nave and aisles, and are slight, closed structures made of wood. The confessional commonly has a door in front, through which the priest enters, and an opening on one or both sides, like a small window, with a grating of wire or zinc, for the penitents to speak through as they kneel.

CONFESSION AND AVOIDANCE. Pleadings are said to be in confession and avoidance, in common-law practice, when they expressly or by a reasonable implication admit the allegations of the pleading to which they are interposed, and show some justification or excuse which will deprive them of the legal effect of supporting the plaintiff's claim of a right to recover. The admission must be sufficiently comprehensive to give color to the matter adversely alleged, i.e., must show it to be prima facie, or apparently, true. Any pleading after the declaration may be by way of confession and avoidance of the last pleading of the opposite party. Thus, if the defendant should plead a release by plaintiff, the latter might in his replication admit that he gave a release, but allege that it was obtained from him by coercion or fraud. This might be denied by the opposite party, and then the cause would be at issue. See PLEADING.

CONFESSION D'UN ENFANT DU SIÈCLE, kôN'fĕ'syôN' dụ näN'fäN' dụ syĕk'l', LA (Fr., The Confession of a Child of the Century). A work of fiction by Alfred de Musset (1836), founded upon the author's love affair with George Sand.

CONFESSION OF JUDGMENT. A method of allowing judgment to be entered against a person upon his acknowledgment in proper form that a claim is, or is about to become, due and owing to another, and consenting that the latter may enter judgment for the amount named. A judgment thus obtained is equally valid and binding as though it had been secured by legal process. While the weight of advantage is with

the person obtaining the judgment, in the saving of the time and expense of litigation, this device may also be of advantage to the debtor in saving him the annoyance and costs of suit involved in the ordinary process. It is commonly resorted to in cases where the debtor desires to prefer a certain creditor and give him the priority over other creditors and the additional security which a judgment affords.

It differs from *cognovit* (q.v.) in the fact that it may be made without the institution of an action, and in the further fact that it is generally limited to debts, in the usual sense of that term, and is not available for the liquidation of claims founded on torts. However, as intimated above, a confession of judgment may be equally valid for a claim not yet accrued, as for future advances.

In a few of the States of the United States it is customary to give a promissory note at the time of its inception the form and character of a confession of judgment, whereby the holder of the note is authorized at maturity, or at a specified time thereafter, to enter up judgment thereupon without further process. This extension of the principle is not, however, generally favored. See JUDGMENT; WARRANT OF ATTORNEY.

CONFESSIONS, LES, lā kôN'fĕ'syôN' (Fr., The Confessions). A remarkable autobiography, of great frankness and dramatic strength, by Jean Jacques Rousseau, composed between 1766 and 1770. The work, in 12 books, was published in 1781 and 1788, after the author's death, contrary to his intention of suppressing it during the lifetime of the persons referred to in it.

CONFESSIONS OF AN ENGLISH OPIUM-EATER. A work by Thomas De Quincey (1821). It describes the effects of opium eating and is an example of impassioned prose which has few, if any, equals in English.

CONFESSIONS OF SAINT AUGUSTINE, THE. A work by St. Augustine in 13 books, of which the first 10 are autobiographical. The remaining three are exegetical, treating the first portion of Genesis.

CONFIDENTIAL COMMUNICATION. See PRIVILEGED COMMUNICATION.

CON'FIRMA'TION (Lat. *confirmatio*, from *confirmare*, to strengthen, from *com-*, together + *firmare*, to make firm, from *firmus*, firm). A sacramental rite admitting to the status of a communicant and to full membership in the church. It follows baptism and in the ancient church the rite was administered immediately after baptism, which is still the custom in the Greek and African churches. In the Roman Catholic church, for the last 300 or 400 years the bishops have interposed a delay of seven years after infant baptism; the Anglican church has no specific rule as to age, 14 to 16 years being the custom. Lutherans administer the rite at about the same age. The ceremony in the Eastern and Western churches consists in the imposition of hands by a bishop or the anointing with oil blessed by a bishop, accompanied by an invocation of the Holy Ghost as the Comforter and Strengthener. The effect of the rite as administered through the bishop is held to be the bestowing of the Holy Ghost to dwell within the individual and to work in a "seven-fold gift"—wisdom, understanding, counsel, might, knowledge, godliness, and holy fear. Both in the English and Lutheran churches the ceremony is made the occasion of requiring from those who have been baptized in infancy, a renewal in their own persons of the baptismal vow made for them by their godfathers and godmothers, who are thereby released from their responsibility. The Lutheran church, having no bishops, administers confirmation through its parochial clergy. In Western theology confirmation is held to be one of the seven sacraments. In the Roman Catholic church in its administration unction and the sign of the Cross are used, in addition to the imposition of hands. See SACRAMENT.

CONFIRMATION. In old English law, a conveyance of an estate or right in lands to one who has the possession or some estate therein, the object being to confirm or render sure and indefeasible an estate which, but for such confirmation, is defective and voidable. It may be illustrated by the case of a disseisin, where the disseisee, or rightful owner, confirms the estate of the disseisor, who is in adverse possession of the land, vesting an absolute and indefeasible title in the latter. A confirmation was effected by deed and was nearly equivalent to a release (q.v.), by which it has been superseded. The confirmation is now, as a separate mode of conveyance, obsolete, though the term is still sometimes employed to describe the release of an outstanding claim to land to the party in possession. See CONVEYANCE

CONFISCATION (Lat. *confiscatio*, from *confiscare*, to confiscate, from *com-*, together + *fiscus*, basket, treasury). The forfeiture of lands or goods to the crown or state. At Rome *bona confiscata* were goods forfeited to the Emperor's treasury. Though sometimes employed in English and American law as synonymous with *forfeiture* for crime, confiscation is, at common law, a term of much more limited signification, and should probably be confined to the cases of the seizure by the crown of waifs (*bona waviata*), or goods scattered by a thief in his flight, and of goods found in the possession of a felon and disclaimed by him. See ESCHEAT; FORFEITURE.

Under certain statutes, however, the state exercises the right to confiscate goods for violation of law, as in case of false entries of goods under customs and other revenue laws, and for violations of excise and internal revenue laws of the United States. The seizure and sale of real property by the state for nonpayment of taxes is a similar proceeding.

Both international law and municipal law recognize the right of the sovereign authorities to confiscate the goods of an alien enemy found within the state, but the right is in fact seldom exercised in modern times.

CONFLICT OF LAWS. An opposition or contrariety between the laws of different jurisdictions affecting the rights of the same individual. In the decision of legal controversies every court regularly applies its own law (*lex fori*), i.e., the law prevailing within its jurisdiction; but exceptionally, and not infrequently, justice requires, and the domestic law itself authorizes, the application of foreign law. The cases in which the question arises whether domestic or foreign law should be applied are figuratively termed cases of conflict; and "conflict of laws" is the title under which it is customary to set forth the rules by which such conflicts are adjusted. Because this branch of the law has been of international growth, and because the rules applied in the different nations are in the main similar, it is sometimes described as "international private law." Apart from other objections, this term is too narrow; for

the rules in question apply not merely to conflicts between the laws of different nations, but also to conflicts between different cantonal or provincial laws within the same state, and to conflicts between the laws of different states within the same empire or federation. To a New York court, the law of New Jersey is as foreign as that of England or of France, and the same rules govern its application. This branch of modern law was developed on the continent of Europe in the Middle Ages; and because in the later Middle Ages all purely local rules, whether of written or unwritten law, were termed "statutes" (*statuta*), it was first known as the doctrine of "collision of statutes." It took form as a body of judicial usages, but its development was largely controlled by the writings of leading jurists. Until the sixteenth century the authoritative writers were Italians (Bartolus and Baldus); from the sixteenth to the eighteenth century they were French (Dumoulin, D'Argentré, Bouhier, and Boullenois), or Dutch (Burgundus, Rodenburg, P. and J. Voet, and Huber); in the nineteenth century the most important treatises were those of the American, Story, and the German, Savigny.

Since Savigny, the effort of writers and of courts has been to determine by what local law each class of legal relations is properly governed. A substantial consensus exists on many of the chief points. 1. Domestic relations are regularly governed by the law of the husband's and father's domicile (*lex domicilii*). 2. Succession, whether testamentary or *ab intestato*, is governed by the law of the decedent's domicile. On the continent of Europe this is generally true of the entire estate, including realty; in England and in the United States the law of the domicile governs the distribution of the personalty only. On the Continent the law of the domicile also governs the liquidation and division of a bankrupt's estate; in England this is true as regards the personalty only. Everywhere the property relations of husband and wife (at least as regards personalty) are governed by the law of the matrimonial domicile. 3. Real property (except on the Continent in the above cases) is governed by the law of the jurisdiction in which it lies (*lex rei sitæ*). 4. Movable things, except in the cases mentioned above, are also governed by the law of the site, i.e., rights vested by the law of the site are respected everywhere and are not affected by the removal of the thing to another jurisdiction. 5. Contractual obligations are governed, so far as the relations between the creditor and the debtor are concerned, partly by the law of the place where the contract was concluded (*lex loci contractus celebrati*), and partly by the law of the place where the obligation is to be performed (*lex loci solutionis*). As regards transfers or assignments of the creditor's claim, however, the law governing transfers of personal property may prevail over the proper law of the contract; and claims (choses in action) regarded as assets of an estate will regularly be governed by the law of the creditor's domicile in the cases mentioned in No. 2.

Back of all these matters lie questions of *capacity*, (*a*) to take and hold property, real or personal, and (*b*) to act with legal result. The question of capacity to take and hold property rarely arises to-day except as regards corporations. This capacity is primarily determined by the law of the state in which the corporation was created; but it may be diminished or denied by the law of the place in which the property is situated. Questions of capacity to act are similarly determined as regards corporations, i.e., capacity must be accorded by the law of the state in which the corporation was created and also by the law of the state in which the corporation attempts to act. As regards natural persons, capacity to transmit property by will or to marry is generally determined by the law of the domicile; capacity to transfer personal property or to contract debt by the law of the place of the act (*lex loci actus*). In the United States, however, capacity to marry is governed by the law of the place of marriage. The sufficiency of the forms observed in legal acts is usually determined by the *lex loci actus*.

As regards wrongful acts, no action of tort can be maintained unless the act was wrongful (tortious) by the law of the place where it was done; and it is commonly held that it must also be tortious according to the law of the place where suit is brought (*lex fori*).

It should be noted that some European countries (Italy, Belgium, and Germany) substitute for the law of the domicile, in nearly all cases, the law of the state of which the person is (or in the case of a deceased person, was) a citizen or subject (*lex ligeantiæ, lex civitatis*); but the dominant theory makes allegiance immaterial in matters of private law.

To all the above rules there is a series of exceptions.

Foreign law cannot be applied unless the domestic law permits its application. If the domestic legislator has expressly declared that a certain law is to govern all cases coming before the domestic courts, or if the purpose of the law would be thwarted by admitting exceptions, foreign law cannot be applied. Nor will foreign law be applied when its application would contravene the settled policy of the domestic law.

Finally, foreign law is applied only as regards questions of right, not as regards remedies—a rule which, properly construed, means that rights are to be enforced according to the methods prescribed by the domestic law.

Foreign law is said to be a question of fact. According to the sounder theory, this does not mean that it is a question for the jury; it means that the court is not bound to know foreign law and may demand evidence concerning it.

A foreign judgment is recognized as conclusive on the facts and on the law when it is a final judgment on the merits of the case by a competent court, i.e., by a court having jurisdiction. Whether the foreign court had jurisdiction is, however, a question which the domestic court will investigate, and will decide on principles of general jurisprudence, i.e., according to its own view of those principles.

Consult: Story, *Commentaries on the Conflict of Laws* (8th ed., ed. by Bigelow, Boston, 1883); Wharton, *Treatise on the Conflict of Laws;* or, *Private International Law* (2d ed., Rochester, 1905); Westlake, *Treatise on Private International Law* (3d ed., London, 1890); Dicey, *A Digest of the Law of England with Reference to the Conflict of Laws*, American notes by J. B. Moore (Boston, 1896). Two valuable German treatises, those of Savigny and Bar, have been translated into English—the former by Guthrie, under the title *Private International Law* (2d ed., Edinburgh, 1880), the latter by Gillespie

under the title *International Law, Private and Criminal* (Boston, 1883).

CONFLUEN'TES. The ancient name of Coblentz (q.v.).

CONFORM'ITY (Fr. *conformité*, from Lat. *conformis*, like, from *com-*, together + *forma*, shape). In geology, the succession of two series of sedimentary or igneous strata in regular order uninterrupted by any interval of erosion. Such strata are said to be "conformable" and bear evidence of having been laid down continuously and without disturbance. The term "conformability" is frequently used as a synonym of conformity. See UNCONFORMITY; GEOLOGY.

CONFRONTÉ, kŏn-frŏn'tā; *Fr. pron.* kôN'-frôN'tā' (Fr., confronted). In heraldry, a term which signifies "facing or fronting one another." It is the same as "combatant." See HERALDRY.

CONFUCIUS, kŏn-fū'shĭ-ŭs (Latinized form of Chinese *Kŭng-fū-tze*, the Master Kung) (c.551–478 B.C.). The most famous of all the sages of China. He was born in the State of Lu in the province which is now called "Shan-tung," where his descendant of the seventy-sixth generation is now living. His lineage is traced by native tradition to Hang Ti, one of the early mythical rulers of China, although Confucius himself was the son of a soldier, Kung Shuh-Liang Heh, who was in command of the District of Chow. China at that time had the feudal system of government, very similar to feudal Europe. When a very old man, over 70 years of age, Heh wedded Chang Tsai in 552, and about a year later had as a son the future sage. When Confucius was but three years old, he lost his father, but the boy was most carefully educated by his mother, though the family was left in reduced circumstances, and trained according to the highest ideals of China. At an early age he gave evidence of his exceptional abilities and his regard for ancient customs, while his thirst for learning was insatiable. When only 17 years old, he was manager for a wealthy landowner of Lu, and two years later he married. As in the case of other great teachers, however, notably Buddha, and, later, Rama Krishna of India, Confucius seems to have been little adapted for family life. He had one son, who was born in 531, and, it would seem, two daughters. After four years he parted from his wife, but doubtless with unbroken friendship on both sides. The real life work of Confucius began when he was 22, and from that time till his death, a period of 51 years, he led the life of a teacher, migrating frequently from place to place. His conduct on the death of his mother, which occurred in 527, is significant as showing the bent of his mind. With a filial devotion very rare at that epoch, he erected a large mound over her as she lay in the same grave with his father, and for 27 months remained in entire seclusion. This time was probably not wasted. Doubtless his meditations during this period of mourning had considerable influence on his subsequent teachings. The effect of his rigorous observance of the ancient ceremonial custom of mourning for parents had an effect on all who knew him and heightened their respect for his words. By the time Confucius had reached the age of 30 he had formulated to his own satisfaction the tenets of his philosophy. In 517 he gained his first pupils of importance, and he was enabled to visit Lo-yang, the capital of the district, where he had an interview with Lao Tsz', the founder of Taoism. On his return to Lu in the following year he found the city in a state of anarchy, and on the expulsion of the Governor, who was his friend, Confucius retired with the ex-official to the neighboring State of Tsi. Here, however, he could not find a congenial home, for his teachings were not acceptable, and he returned to Lu, where he remained for the next 15 years, carefully keeping himself aloof from all factional strife and never slackening his devotion to his mission. At last his moral worth received its reward, and at the age of 52 Confucius was appointed Governor of Chung-tu, and this honor was followed by others higher still. Through the machinations of the Governor of Tsi, however, who was afraid that the wise counsels of Confucius would make the State of Lu supreme in China, the influence of the master in Lu was so weakened that he left the country after four years, at that time 56 years of age. For 13 years he wandered from place to place and did not return to Lu until in his sixty-ninth year. His last years were spent in well-earned retirement; but they were full of sorrow, marked by the deaths of his son and his two best-loved disciples, Yen Hui and Tsz' Lu. In 478 the teacher himself died, saddened by the fear lest he had failed to accomplish his mission. Herein he was wrong. The news of his death spread throughout the land and called attention anew to his purity of life and teaching, so that the name of Confucius has ever since been the highest and most honored in the land to which he gave his lifelong devotion. By the irony of fate he was deified after his death, and, like Buddha, Confucius, who had little belief in the supernatural, became a divinity.

Confucius was, as he himself said, not a reformer, but a conserver. This is strikingly evident in his services to the literature of China. Although he is sometimes called a prolific author, he was in reality but a careful though voluminous editor, and he may, if this is clearly understood, be termed the founder of Chinese literature. Thus he established the canon of four of the "five classics," the *Shih Ching*, or 'Book of Poems,' the *Li Ching*, or 'Book of Rites,' the *I Ching*, or 'Book of Changes' (originally a cosmological work), and the *Shu Ching*, or 'Book of Historical Documents,' for which Confucius is said to have composed a preface, although merely a list of books which the *Shu Ching* once contained now remains. His one independent work, apart from his apothegms which were recorded by his disciples, is the *Ch'un Tsin*, or 'Spring and Autumn.' This is an extremely dry annalistic history, very meagre in content and information, and altogether untrustworthy as a source of Chinese history, and records the events in the State of Lu from 721 to 480 B.C., a period of 242 years.

Confucius was in no real sense of the word a religious teacher, in fact, did not concern himself with religion. His doctrines were entirely ethical and political. His attitude towards the supernatural may be summed up in his own words: "Respect the gods! but have as little as possible to do with them," and it is recorded that he spoke but seldom of four subjects—marvels, feats of strength, rebellions, and spiritual beings. In harmony with this attitude he expresses no opinion concerning the immortality of the soul. He inculcates ever the duty, which he himself had observed so faithfully, of honor to parents and of obedience to temporal power. In this way the individual becomes absorbed

in the family and the family in the state, which was regarded by Confucius as the highest concept on earth. For a state to be prosperous, mercy and all other virtues are necessary, and these qualities are to be manifested by the entire body of citizens. If the emperor was a wicked man and a bad ruler, Confucius taught that he need not be obeyed and that his subjects were free to depose him, which principle the Chinese many times afterward put into effect. The teachings of Confucius are, consequently, wholly worldly in character, and the dry maxims in which he expressed his views are permeated by a utilitarian philosophy which is devoid of any touch of idealism. His attitude towards women is the one generally current in the Orient. Metaphysical speculation, like religious investigation, is absent from his system, which sums up its principles in the five cardinal virtues—humanity, uprightness, decorum, wisdom, and truth. Confucius may perhaps be said to be China incarnate in his lack of originality; but with his devotion to the practical and his moral principles as patriot, sage, and teacher, he ranks among the foremost men that the world has ever seen. The most valuable account of Confucius is contained in the *Lun Yu*, or 'Philosophical Dialogues,' which record his conversations, while the *Ta Hsueh*, or 'Great Learning,' and the *Chung Yung*, or 'Doctrine of the Mean,' are important sources for the study of his system of philosophy.

As illustrations of the maxims of Confucius, the following characteristic ones may be cited: Learning without thought is labor lost; thought without learning is death of the mind. Riches and honor are what men desire; yet, except in accordance with right, they should not be enjoyed: poverty and degradation are what men dread; yet, except in accordance with right, they should not be avoided. What the superior man seeks is in himself; what the small man seeks is in others. The foundation of all good is the virtue of individual men. Confucius also enunciated the Golden Rule, although in negative terms, as follows: "What ye would not that others should do unto you, do ye not unto them." Despite the negative form of this maxim, it is to all intents and purposes closely parallel to the Golden Rule as given by Christ.

Some one has said that, no matter of what religion a Chinese may be, he is ex officio a Confucianist. This is as true of China to-day as it ever was in the past. At present there is a strong movement going on in Republican China to have Confucianism recognized as the state religion. It is significant to note that Yuan Shī-K'ai revived the former Imperial ceremonies in connection with the veneration of the master. This was done, however, not for the purpose of sanctioning Confucianism exclusively, but by such means to hold the people in the present period of change true to the old standards of ethics and morality.

Consult: Plath, *Confucius und seiner Schüler Leben und Lehren* (Munich, 1867–74); Von der Gabelentz, *Confucius und seine Lehre* (Leipzig, 1888); Haug, *Confucius der Weise Chinas* (Berlin, 1880); Dvorak, *Chinas Religionen*, Band i, *Confucius und seine Lehre* (Münster, 1895); Legge, *Life and Teachings of Confucius* (London, 1887); Douglass, *Confucianism and Taoism* (ib., 1879); Huan Chang Chen, *The Economic Principles of Confucius and his School* (New York, 1911). For the original sources, Legge's translations of the *Lun Yü*, *Ta Hsüeh*, and *Chung Yung* in the first volume of his *Chinese Classics* (Hongkong and London, 1861) should be consulted as of the first importance. The same scholar's translations of the *Texts of Confucianism* (comprising the *Shu Ching*, *Hsiao Ching*, *I Ching*, *Li Ching*, and portions of the *Shih Ching*), vols. iii, xvi, xvii, xviii of the *Sacred Books of the East* (Oxford, 1879–95), are also of value.

CONFUSION (Lat. *confusio*, a mixing together, from *confundere*, to mingle or mix together, from *com-*, together + *fundere*, to pour, pour out) OF GOODS. The intermingling of the goods of two or more several owners so as to be indistinguishable. This may occur voluntarily, or by agreement of all the parties concerned—as in the common case of the deposit of grain in a common storage elevator; or accidentally, as when, in case of fire or shipwreck or innocent mistake, goods are inextricably mingled together; or the confusion may be malicious and willful, as when one person takes gold belonging to another and throws it into the melting pot with his own. In the first two cases the law adjusts the rights of the parties by making them tenants in common of the mixture, in the proportion of their respective contributions thereto, and, where the portions confused are of unequal value, in the proportion of their respective values. In the case of a willful confusion, however, the common law originally adopted the stringent rule of giving the entire mass to the innocent party, and this principle would still be applied in some common-law jurisdictions. The present tendency, however, in England as well as in the United States, is to adopt the milder rule of the Roman or civil law, either making the parties tenants in common of the mixture, as in the other cases referred to, or permitting the innocent party to recover the value of his share at the time of the confusion. Compare ACCESSION. Consult Schouler, *Treatise on the Law of Personal Property* (Boston, 1896).

CONGAREE (kŏn'gâ-rē') **RIVER.** A river of South Carolina, formed by the junction of the Broad and the Saluda rivers, 1 mile northwest of Columbia (Map: South Carolina, D 3). It flows southeast and, joining the Wateree, forms the Santee. It is 60 miles long and navigable to Grandby, 2 miles below Columbia. Above that city it furnishes considerable water power.

CONGÉ D'ÉLIRE, kôn'zhâ' dā'lēr' (Norman-French, Fr., permission to elect). The name given in England to the King's warrant or permission to a dean and chapter of a cathedral to proceed to the election of a bishop or archbishop to a vacant see. Since the passing of the Statute 25 Hen. VIII, c. 20, with the exception of short periods in the reigns of Edward VI and Mary, the congé d'élire has always been accompanied by a letter missive from the King, mentioning the person to be elected by name, so that in reality it is an appointment by the crown. If the dean and chapter delay the election beyond 12 days, the appointment is effected by letter patent from the crown; if they elect another than the person named, they incur the penalties of a præmunire, i.e., loss of civil rights, forfeiture of their goods, and imprisonment during the royal pleasure. The same penalties are imposed upon any bishop or archbishop who neglects to assist in the consecration and investment of a bishop so elected, within 20 days after the royal announcement of his

election. Consult Stephen, *Commentaries*, vol. iii (London, 1886).

CONGEN'ITAL DISEASE (Lat. *congenitus*, born with, from *con-*, together + *gignere*, to beget). A term used to denote any disease with which an infant enters the world. Congenital diseases may be acquired from the mother during pregnancy or during the act of delivery. In the former class belong syphilis and, according to some authorities, smallpox. The latter class is to be separated into two subdivisions: (1) diseases obtained by infection from the parturient canal of the mother, as syphilis, gonorrhœa, septic peritonitis, purulent ophthalmia, and pyæmia; (2) conditions due to accidents occurring during delivery of the infant, such as asphyxia, atelectasis (unexpanded lungs), and cephalhæmatoma (tumor of the scalp containing bloody fluid). Infants may also develop an acute fatty degeneration as well as tumors and malformations of various kinds before birth.

CONGER, kŏŋ'gẽr (Lat., from Gk. γόγγρος, *gongros*, conger), or CONGER EEL. A marine eel (*Leptocephalus conger*) of the family Leptocephalidæ, having the form of the typical eels, but no scales. The head is pointed and the mouth deeply cleft. The teeth in the outer series of either jaw are placed closely together so as to form a cutting edge. The dorsal fin commences much nearer the head than in the fresh-water eel and is confluent with the anal around the tail. The conger grows to a length of 8 feet and a weight of 25 or 30 pounds and is almost cosmopolitan. "Congers feed chiefly by night and prey upon crustaceans, cuttles, and various kinds of fish. . . . Their favorite resorts are either hollows or crevices in the rocks or sandy bottoms, in which they can bury themselves; and in such situations they are sometimes left by the ebbing tide. The flesh of these eels is of a highly gelatinous nature and is said to be largely employed in soups." American fishermen usually call them sea eels. Several Oriental species are known; and the name is sometimes applied to other similar fishes, as those of the genus *Synaphobranchus*. The conger passes through a metamorphosis, "the young being loosely organized, transparent, and band-shaped, with a very small head. The body grows smaller with age owing to the compacting of the tissues." This larval form was mistakenly described as a different genus, *Leptocephalus*. This name, being the older, has displaced the long-used generic term *Conger*. It is estimated that the number of eggs deposited by a single female in an aquarium has been as great as three and a third millions. See EEL; and Plate of EELS, CONGERS, AND MORAYS.

CONGER, EDWIN HURD (1843–1907). An American politician and diplomat, born in Knox Co., Ill. He graduated in 1862 at Lombard University (Galesburg, Ill.) and at the Albany Law School in 1866 and in the latter year was admitted to the bar of Illinois. He served in the Federal army during the Civil War, was brevetted major, and in 1868 set up as a stockman and banker in Iowa. From 1885 to 1891 he was a member of Congress, and at the close of the latter year was appointed Envoy Extraordinary and Minister Plenipotentiary to Brazil. In 1898 he was transferred to the embassy in China. He was the only representative of a foreign power who, during the siege of Peking from June 28 to Aug. 14, 1900, was able to send a communication to his government, and he took a leading part in the peace negotiations after the siege. In 1905 he was appointed Ambassador to Mexico, but resigned the same year.

CONGES'TION (Lat. *congestio*, accumulation, from *congerere*, to carry together, from *com-*, together + *gerere*, to carry). An abnormal increase of blood in the vessels, due to increased pressure in the arteries or obstruction to the emptying of the veins. Emotion or exercise, by causing the heart to beat more rapidly; alcohol, or other drugs, by expanding the arteries as well as stimulating the heart; local irritation, by cold, a blow, or a burn—may cause congestion of the active variety, with the production of a rosy color. A tight garter, a stooping posture, or the swelling of a finger from injury may cause passive congestion by obstructing the veins, in which case the color of the congested part is bluish or purple. In certain diseases in which the heart becomes weak and circulation fails, as pneumonia, typhoid fever, and septic conditions, the blood gravitates to the most dependent parts of the body, and "hypostatic congestion" of the lungs, liver, and skin results mechanically. Congestion occurs during many diseases.

CONGLETON, kŏŋ'g'l-ton. A market town of Cheshire, England, beautifully situated on the Dane River and the Macclesfield Canal, about 26 miles south of Manchester (Map: England, D 3). Its chief industries consist of manufactures of silks, ribbons, and towels, salt, furniture, nails, iron and brass work, and stone. Coal is mined, and there are a number of corn mills. Pop., 1901, 10,706; 1911, 11,309. Congleton appears in the *Domesday Survey*, and received a charter from the Earl of Lincoln in the thirteenth century.

CONGLETON, HENRY BROOKE PARNELL. See PARNELL, HENRY BROOKE.

CONGLOM'ERATE (from Lat. *conglomeratus*, p.p. of *conglomerare*, to roll together, from *com-*, together + *glomerare*, to roll into a ball, from *glomus*, ball). A sedimentary rock (commonly called "pudding stone") composed of pebbles cemented together by finer-grained rock material. The cementing substance is commonly lime carbonate or an oxide of iron; quartz also occurs and makes a very hard, durable material which is sometimes used for millstones. The millstones quarried in the United States are mainly a quartz conglomerate that is found along the eastern slopes of the Appalachians from New York to North Carolina. Conglomerates form along shores, and the pebbly beaches which are now forming will, when consolidated, produce conglomerates. Since conglomerates can form only in shallow water (where the force of the waves is sufficient to move pebbles), their occurrence within the strata of the earth's crust indicates an encroachment of the sea upon the land. Such an encroachment occurs during and after a subsidence of the land beneath the sea, when deposits of sediment are laid down. Conglomerates, therefore, generally lie at the base of geological formations and serve to separate these formations from one another. They are also common in glacial deposits, consisting of pebbles that have been carried along by the ice and sorted out by the streams that issued from the glaciers. Such conglomerates are

characterized by angular and subrounded pebbles that may show striations and groovings from abrasion while they were transported along the bed of the glacier. Glacial conglomerates are cemented usually by calcium carbonate in the form of calcite or aragonite.

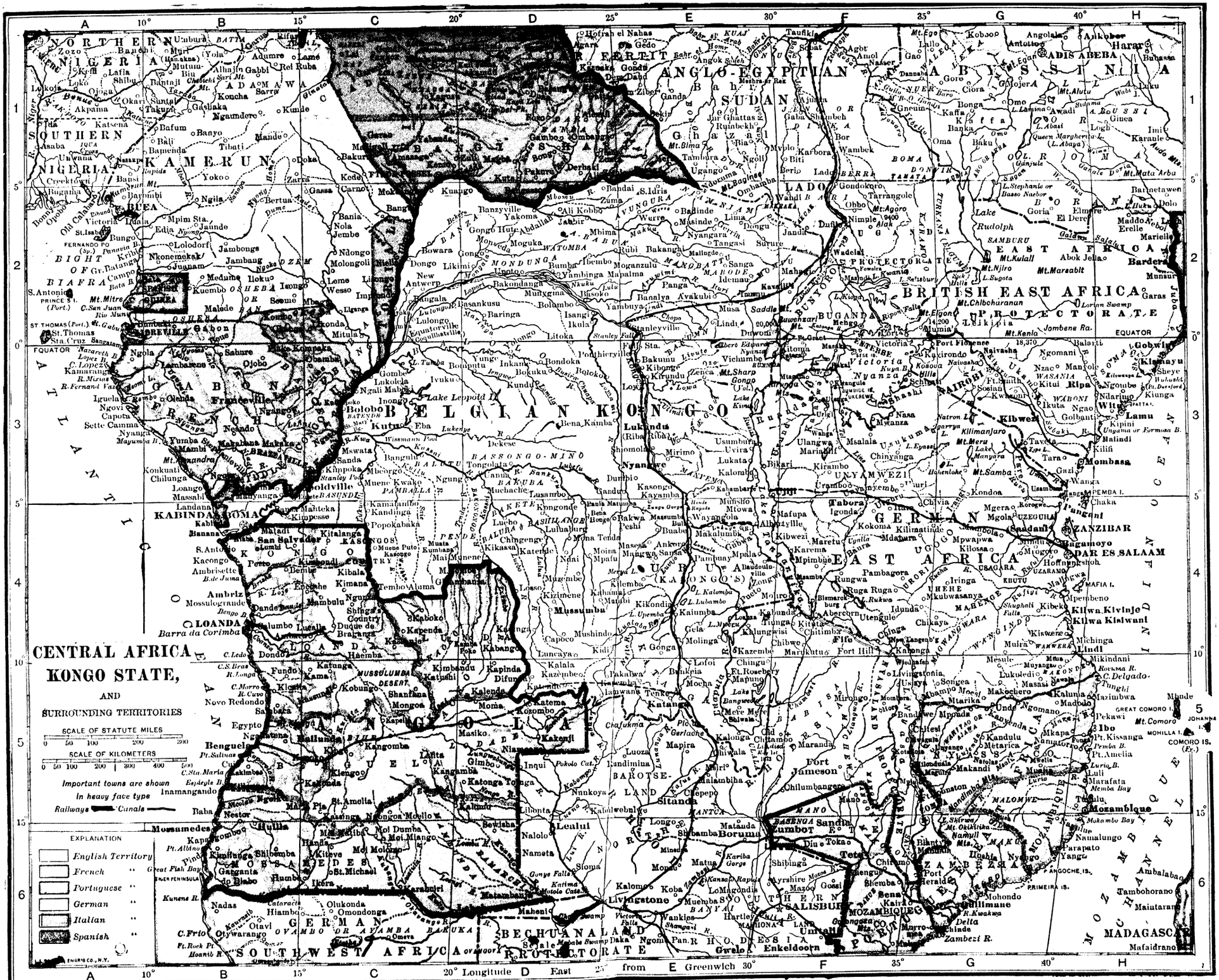
CONGO, kŏn'gō, or **KONGO** (from the African tribe of *Mosicongo*). The largest and, excepting the Nile, the longest river of Africa and one of the great rivers of the earth. It drains most of Central Africa west of long. 32° E., from lat. 8° N. to 13° S. It is formed by the union of two great streams—the Lualaba, from the south, whose sources on the Zambezi water parting are believed to be the ultimate fountain head of the Congo; and the Luapula (also known as the Kuvua) from the southeast, which drains Lake Bangweolo, the ultimate source of this branch of the Congo being the Chambezi affluent of Bangweolo. The drainage system is extended farthest east, however, by the eastern tributaries of Lake Tanganyika which send the waters of a large area within 500 miles of the Indian Ocean, to Tanganyika, through the Lukuga outlet to the Congo and down that river to the Atlantic. Below the Lukuga several minor streams are received by the Congo, mainly from the eastern side, until, at the equator, in long. 24° 30′ E., at a point about 80 miles below Stanley Falls, the Congo is joined by the Lomami, which has a parallel course on the west. Eastward of this point the Congo begins its great bend towards the west. About 60 miles below the entrance of the Lomami, the Aruwimi enters the Congo from the east, and still farther downstream there join at intervals from the north the rivers Rubi, Mongala, Ubangi (all great rivers, the Ubangi being larger than any rivers of Europe excepting the Volga and Danube), Sanga, Likuala, and Alima, besides smaller streams; and from the south the Lulonga, Ruki, and Kasai. Below these, throughout the lower 500 miles of the river's course, only small tributaries are received. Between the Atlantic and the great lakes the basin of the Congo consists of three successive terraces. The three zones thus formed are: 1. A narrow coastal strip lying between the sea and the coastal ranges; its elevation rises gradually to about 2000 feet. 2. A vast central zone of depression lying between the Atlantic ranges and Mitumba Mountains. 3. An elevated zone at the eastern end of the basin. It is in the descent from the plateau near the west coast that the chief impediments to navigation occur. The basin has a great tropical forest extending east of the Congo between the Aruwimi and the Nile system, and there are large forest areas to the south of the northern bend of the Congo; but the greater part of the country consists of rolling savannas interspersed with timber. The river is navigable for ocean steamers from its mouth to Matadi, a point about 100 miles upstream, where navigation is interrupted by falls and rapids; and also by steamboats from Stanley Pool to Stanley Falls, for a distance of over 1000 miles farther. The length of the navigable waters of the Congo system is estimated at about 6000 miles. The completion of the Matadi Railroad, about 250 miles in length, from Matadi to Stanley Pool, around the falls and rapids which interrupt navigation between those points, has placed the middle course of the river in communication with its estuary, and the building of the railroad between Stanleyville (at Stanley Falls) and Ponthierville, 75 miles, finished in 1906 and circumventing the upper rapids, has extended steam transportation 200 miles farther up the river. The Congo has a length of about 3000 miles and drains an area of more than 1,400,000 square miles.

CONGO, BELGIAN, formerly CONGO FREE STATE. A colony founded in 1882 as an independent state under the sovereignty of King Leopold II of Belgium. Annexation to Belgium was accomplished by means of the Treaty of Nov. 28, 1907. Situated approximately between long. 12° and 30° E. and between lat. 14° S. and 6° N. (Map: Africa, G 5), it is bounded on the north by French Equatorial Africa and the Anglo-Egyptian Sudan, on the east by British East Africa, German East Africa, and Northern Rhodesia, on the south by Northern Rhodesia and Portuguese West Africa, and on the west by Portuguese West Africa, the Atlantic, and French Equatorial Africa. The boundaries of the colony, with the Congo and Ubangi rivers on the west, and Lakes Tanganyika, Moero, Albert Edward, and Albert, on the east, are all well defined, and the area is estimated at about 909,654 square miles.

The surface of Congo is a depressed plateau basin, which is unbroken by mountains except in the western part near the Atlantic, and in its southeastern corner. It rises on its borders to elevations of 6000 feet and more. The river valleys are occupied by dense forests, while the remainder is composed of wooded savannas and arable land. The chief river is the Congo (q.v.), which, together with its tributaries, drains nearly the entire territory. The climate is hot and moist, but the annual white death rate has been reduced to about 6 per cent. The normal temperature ranges from 60° to 90° F., and not infrequently an exceedingly hot day is followed by a chilly night. The climate in the interior is not so injurious to Europeans as that of the coast region. In the elevated portions of the colony, like the Katanga District, the climate is perfectly salubrious.

The flora of Congo is very rich and varied, the forests being full of rubber vines (one tree) and others yielding gums and resins. Among the cultivated plants are the coffee, cotton, yam, papaw, pineapple, cassava, corn, rice, peanut, sweet potato, banana, bean, tobacco, sorghum, and Kafir corn. The fauna includes the elephant, hippopotamus, buffalo, antelope, chimpanzee, and crocodile. Elephants are numerous, but their slaughter is now prohibited, and ivory exports, which are abundant, are chiefly from earlier accumulations by the native population. Iron, tin, and coal occur in many localities, while copper is confined to rich deposits in the southeast (Katanga). Gold is also found there. Katanga is the richest mineral region in the colony.

The natural agricultural possibilities of the colony are very great, but the unhealthful climate, which practically forbids white immigration, largely retards systematic agricultural development. Rubber, gathered for many years under compulsion by the natives, is the chief product and export. The development of the rubber industry is shown by the following export figures (special trade): 1898–1900, 3,725,596 kilos annual average, valued at 27,941,970 francs; 1901–05, 5,396,775 kilos annual average, valued at 44,055,539 francs; 1906–10, 4,246,595 kilos annual average, valued at 43,367,338 francs; 1910, 3,416,784 kilos, 51,015,-


CENTRAL AFRICA
KONGO STATE,
AND
SURROUNDING TERRITORIES
SCALE OF STATUTE MILES
0 50 100 200 300
SCALE OF KILOMETERS
0 50 100 200 300 400 500
Important towns are shown in heavy face type
Railways
Canals
EXPLANATION
English Territory
French "
Portuguese "
German "
Italian "
Spanish "
BELGIAN KONGO
ANGLO-EGYPTIAN SUDAN
ABYSSINIA
ADDIS ABEBA
NIGERIA
SOUTHERN KAMERUN
BRITISH EAST AFRICA PROTECTORATE
EAST AFRICA
GERMAN EAST AFRICA
ZANZIBAR
DAR ES SALAAM
MOMBASA
NAIROBI
KISUMU
UGANDA PROTECTORATE
LADO
FRENCH CONGO
GABON
FRANCEVILLE
LOANDA
BENGUELA
MOSSAMEDES
GERMAN SOUTH WEST AFRICA
BECHUANALAND PROTECTORATE
PORTUGUESE EAST AFRICA
SALISBURY
BEIRA
MOZAMBIQUE
MADAGASCAR
ATLANTIC OCEAN
INDIAN OCEAN
Longitude East from Greenwich

649 francs; 1911, 3,401,970 kilos, 34,426,896 francs; 1912, 34,519,000 francs. In the general trade the export of rubber was valued at 50,424,000 francs in 1911; 76,030,000 in 1910; 45,183,000 in 1901; 20,655,000 annual average, 1896–1900; 2,260,000 annual average, 1887–90. Other products for export are palm kernels and palm oil, white copal, cacao, coffee, corn, kola nuts, raw gold, ivory, raw copper, and rawhides.

Transportation facilities are mainly provided by the Congo and its several navigable tributaries. The Congo is interrupted in its lower part, from Matadi to Leopoldville, a distance of about 200 miles, by a series of rapids—a great obstacle to direct communication between the interior of the country and the Atlantic. To obviate this difficulty, a railway line about 249 miles in length was constructed between Matadi and Stanley Pool, and opened for traffic in 1898. Above the rapids the river is navigable for 1000 miles to Stanleyville. A railroad, 75 miles long, was completed (1906) around Stanley Falls to Ponthierville, making possible combined rail and steamboat communication from the mouth of the Congo over 2000 miles up the river. The following lines were in operation Jan. 1, 1912; Matadi to Stanley Pool, 249 miles; Stanleyville-Ponthierville, 78. Kindu-Kongolo, 221; Rhodesian frontier to Elisabethville, 163 (total line, 171), Boma-la Lukula, 50; total, 767. On the same date there were under construction the Lualaba-Tanganyika line, 168 miles; Elisabethville-Bukama, 101; and la Lakula-Thela, 35; total, 304. From Stanleyville, which is approximately 1300 miles above the mouth, a railway is being constructed (through an agreement with Great Britain) to the Nile River, where it will connect with a railway line (near Lado) which extends to the Red Sea, thus giving a complete steam transportation line across Africa. Another line is to connect the navigable waters of the upper Congo with Lake Tanganyika and another to connect with the Cape to Congo Railway about 2300 miles north of Cape Town. During 1912 and 1913 construction work progressed rapidly. The government and private enterprises run many steamers on the upper Congo. The total number of miles of waterway by river and lake in the Congo is estimated at 9500. There is steam communication regularly each fortnight with Antwerp, and also frequent communication with other European ports. The length of telegraph line in 1912 was 1145 miles, with 1680 miles of wire and 19 offices; wireless stations, 5; post offices, 50.

The development of the trade is shown in the following table, the values being given in francs:

	GENERAL		SPECIAL	
	Imports	Exports	Imports	Exports
1896–1900*	24,711,700	29,771,839	21,508,728	35,202,947
1901–05*	25,188,780	61,512,080	21,099,779	52,015,706
1906–10*	33,574,203	76,960,388	26,443,836	56,662,785
1910	43,979,142	95,598,698	36,846,508	66,602,295
1911	58,385,060	78,955,399	48,632,877	54,052,426
1912	61,864,000	83,465,000	53,868,000	59,125,000

* Annual average.

The principal articles of export in the special trade are rubber (27,941,970 francs, annual average, 1898–1900, 34,426,896 francs in 1911, and 34,519,000 in 1912), ivory (5,135,727 and 5,683,468 francs, in 1912, 5,552,000 francs), white copal (9628 and 3,348,317), raw gold (140,394, annual average, 1901–05, and 3,119,050 in 1911), palm kernels (1,297,331, annual average, 1898–1900, and 2,878,674 in 1911), palm oil (738,227 and 1,731,898), raw copper (4,112,000 francs in 1912), cacao (4365 and 895,543), coffee (10,044 and 3218), etc. The chief articles of import are textiles, boats and machinery and parts for boats, arms and munitions, machinery including rolling stock and materials for railway, telegraph, and telephone construction, beverages, foodstuffs, metals, etc. Belgium furnished in the special trade imports valued in 1912 at 35,785,000 francs, and received exports valued at 53,814,000 francs; United Kingdom, 5,670,000 and 558,000; Germany, 4,079,614 and 614,000; France, 1,141,000 and 23,000. Imports of the United States of the products of Belgian Congo are drawn from Belgium and other European countries, and are chiefly India rubber and ivory; the exports direct to Congo were in 1913 $14,905. There is an import duty of 10 per cent ad valorem on arms, ammunition, and salt, and of 6 per cent on all other articles, with the exception of machinery and agricultural implements, which were admitted duty free from 1892 to 1896, and since then have been liable to a duty of 3 per cent. There is an export duty on rubber and several other articles. The principal ports are Boma (the seat since 1906 of the American Consul General) and Banana, whose combined oversea shipping, entered and cleared, was over 1,600,000 tons in 1911, over one-half being Belgian. The coasting trade is small.

The Congo Free State was annexed by Belgium as the colony of the Belgian Congo by Treaty of November, 1907, approved by the Belgian Parliament in August and by the King in October of the following year. The colony is administered by a governor-general at Boma, assisted by several vice governors-general. In Brussels there is a colonial minister, who presides over the Colonial Council of 14 members, of whom 8 are appointed by the King and 3 chosen by the Senate and 3 by the Chamber of Deputies. The colony is divided into 15 administrative districts. The colonial budget is voted annually by the Belgian Parliament. The colony has a force of native troops, recruited by conscription and volunteering, amounting to about 18,000 men. The budget for 1913 showed estimated revenue of 40,418,100 francs and estimated expenditure of 50,933,064 francs; the public debt in 1912 was 151,222,200 francs.

The population has been variously estimated, but is believed to be about 15,000,000. At the beginning of 1912 whites numbered 5465, of whom 3307 were Belgians. The inhabitants are mostly of the Bantu race. The Azandés, a superior native people, are found in the northeast, and there are many Pygmies along upper Congo affluents. Among the numerous "stations" in the Belgian Congo are: Boma, the capital, situated on the Congo, about 50 miles from its mouth, and the centre of a large trade; the port of Banana, with an excellent harbor; Matadi, terminus of the railway at the foot of the Congo Rapids; Leopoldville, Stanley Pool, Coquilhatville, Basoko, and Stanleyville. Missionary work, though without financial support from the state, is being actively and successfully carried on at 138 missions. The instruction is educational as well as religious. The missions coöperate with the state, which has

formed colonies where agricultural and other instruction is given.

Ethnology. The natives of the Congo represent two principal physical types, Pygmies and Negroes. The Pygmies are sprinkled over the greater part of the equatorial forest, often living in close contact with dominant Negro peoples, e.g., with the Bakuba in the southwest and the Mangbettu in the northeast. The Negroes represent considerable differences of a minor character, and in the northeast an infusion of Ethiopian and Nilotic blood is practically certain. Linguistically the Bantu stock predominates, but in the northeast Sudanese languages are spoken. Up to date there is no satisfactory evidence of distinct Pygmy tongues, the Pygmies having adopted the speech of neighboring Negro populations.

Finds during recent years indicate the one-time existence of a Stone age, but throughout the Congo the art of smelting iron is now practiced with great skill. Industrial development reaches its high-water mark in the Kasai District, where the Bakuba (Bushongo) produce wonderfully beautiful wood carvings and pile cloth of plushlike appearance. Pottery and basketry likewise flourish. Economically the Congolese Negroes are mainly dependent on hoe agriculture, though hunting and fishing are not unimportant. In several regions, notably among the Bakongo, Balunda, Bakuba, and Mangbettu, powerful monarchies have developed in historical times. The social organization of the Congolese is imperfectly known: the Bakuba (Bushongo) have maternal descent, while the Azande are reported to be patrilineal. Religious practices and beliefs seem to centre in fetishism. See Colored Plate of DARK RACES OF AFRICA with the article AFRICA.

History. The Congo Free State was established as a neutral independent sovereignty. In 1876 King Leopold II of Belgium had organized, with the coöperation of the leading African explorers and the support of several European governments, the International African Association (q.v.), for the promotion of African exploration and colonization. In the following year Henry M. Stanley called attention to the Congo country and was sent there by the association, the expense being defrayed by Leopold. By treaties with native chiefs rights were acquired to a great area along the Congo, and posts were established. After 1879 the work was under the auspices of the Comité d'Etudes du Haut Congo, which developed into the International Association of the Congo. This organization sought to combine the numerous small territories acquired into one sovereign state and asked for recognition from the civilized governments. On April 22, 1884, the United States government, having decided that the cessions by the native chiefs were lawful, recognized the International Association of the Congo as a sovereign independent state, under the title of the Congo Free State, and this example was followed by Austria-Hungary, France, Germany, England, Italy, the Netherlands, Portugal, Russia, Spain, and Sweden. The international conference on African affairs which met at Berlin, 1884–85, determined the status of the Congo Free State. By the Act of the Conference, signed Feb. 26, 1885, the Congo Free State was declared neutral and open to the trade of all nations, the Powers reserving for 20 years the right to decide as to the taxation of imports; the navigation of the Congo and its affluents was to be free, under the supervision of an international commission; religious freedom and equality of treatment of all settlers were guaranteed; and war was declared upon the slave trade. The United States refrained from ratifying this act, on the ground that it would thereby be committed to certain international engagements. The new state was placed under the personal sovereignty of Leopold II, who by will, four years later, bequeathed it to Belgium. On July 31, 1890, the territories of the Congo Free State were declared inalienable.

The central government of the state was located at Brussels and was constituted by the King of Belgium and a Secretary of State, the latter being head of the departments of Foreign Affairs, Finance, and the Interior. The King's power was not limited by a constitution, but was somewhat circumscribed by the General Act of Berlin of 1885 relative to the organization of the Congo Free State. The direct administration was in the hands of a governor-general at Boma, assisted by a vice governor-general. According to the agreement of 1890, between Belgium and the Congo Free State, the former obtained the right of annexing the latter after a period of 10 years. In 1901 the question of annexation came up before Parliament, and the right of annexation was reserved to the King alone.

In accordance with the tariff reservation in the Act of 1885, the international conference at Brussels in 1890 authorized the Congo Free State to levy duties on certain imports in order to provide the needed revenue. By the Treaty of 1891 the United States established relations with the Congo Free State, providing for commercial intercourse and a consular system and for the arbitration of any dispute under the treaty. Several separate treaties with the European states having colonial possessions in Africa adjoining the Congo Free State have defined its boundaries. There is a difference of opinion in regard to the success of the work done by Belgium on the Congo. Largely as the result of agitation carried on in England, a Belgian commission of inquiry was dispatched to Boma in the fall of 1904 to examine into the charges of oppression, cruelty, and restriction of trade brought against the Belgian authorities. The report of the commission presented November, 1905, showed the existence of widespread evils. The natives were the victims of a crushing system of forced labor imposed with particular severity in the territories under the control of the concessionary commercial companies. Nevertheless forced labor, though in a modified form, was declared necessary for the salvation of the country. The native police employed by the companies were guilty of revolting atrocities, and armed punitive expeditions were carried on by the companies against recalcitrant villages. The great decrease in population was ascribed to the prevalence of epidemics, the sleeping sickness, and emigration following on the extinction of the ivory trade. Reforms were declared necessary, but at the same time the commission pointed out the civilizing work that had been accomplished. Cannibalism was practically extinct, and human sacrifice was rare. Towns had been built on the banks of the Congo, and railroads and telegraph lines extended. A reform committee subsequently drew up a

scheme of reforms, part of which was accepted by King Leopold and issued as decrees in June, 1906. The most important of these reforms were the following: The natives were secured in the possession of their lands, but the right of determining rightful possession rested exclusively in the state. The natives were allowed to pay taxes in kind or in labor, forced labor not to exceed 40 hours per month. A native less than 14 years old could not be compelled to sign a contract for more than two years of ordinary work and for more than three years of domestic service. Punitive expeditions, which could be ordered only by the Governor-General or the district commissioners or their representatives, were not to be resorted to until after persuasion had been tried, and in no case was the direction of police or military operations to be confided to natives. The King also denied the right of any foreign power to interfere in the administration of the affairs of the Congo State. This settlement, however, soon proved unsatisfactory. The reforms were but partly enforced; several native riots occurred; consular and missionary reports continued to insist that the natives were treated with great cruelty. The British government became restive, and even the United States Senate urged President Roosevelt to use his good offices. As a result of this agitation, the semi-independence of the Congo Free State came formally to an end, and on Nov. 29, 1910, a treaty was signed ceding the Congo Free State outright to Belgium. It now became Belgian Congo. New reforms were started by the Belgian government; the natives were permitted to pay their taxes in silver instead of rubber; their right to the free disposition of the fruits of the soil was recognized, and in the meantime railway construction was undertaken on a large scale, a considerable portion of which was already completed by 1913. The thoroughness of the Belgian reforms has been much questioned. The Congo Reform Association as late as 1912 insisted that Belgium, despite the assurances of the colonial administration, was simply playing with reform and pointed out, in a memorial to the British government, the great reduction in population, the social and economic misery in the Congo. Sir Edward Grey stated, however, that no action could be taken, and in 1913 the association formally disbanded, leaving Belgium without any organized opposition.

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CONGO FREE STATE. See CONGO, BELGIAN.

CONGO PEA. See PIGEON PEA.

CONGO RED. See COAL-TAR COLORS.

CONGO SNAKE. A small, eel-like amphibian (*Amphiuma means*), with very small two-toed legs, and eyes covered with skin. It is found in the rice fields of the Southern States, where it is much feared by the common folk. It is wholly harmless and burrows in mud in search of fishes, snails, and insect larvæ. It lays under logs, etc., a mass of eggs, which have a firm, transparent skin, and are connected by cords into a string; these seem to be guarded and kept moist by the mother (*Bulletin United States National Museum*, No. 34, p. 220). The *Amphiuma* is remarkable as being the only salamander possessing a voice; when angry or excited, it gives a clear whistle. See AMPHIUMA.

CON'GREGA'TION (Lat. *congregatio*, from *congregare*, to flock together, from *com-*, together + *gregare*, to flock, from *grex*, herd). An assembly; generally a religious assembly; in its most ordinary sense, an assembly of Christians met in one place for worship. (See CHURCH.) In the Roman Catholic church it often designates a sort of board of cardinals, prelates, and divines to which is intrusted the management of some important branch of the affairs of the church. For example, the *Congregation of the Index* examines books and decides on their fitness for general perusal. (See INDEX.) The *Congregatio de Propaganda Fide* consults as to the advancement of the Roman Catholic religion throughout the world. (See PROPAGANDA.) The *Congregation of Relics* inquires into the genuineness of supposed relics. *The Congregation of the Holy Office* takes cognizance of heresies, etc. (See INQUISITION.) The *Congregation of Rites* regulates the festivals and offices of new saints.

Religious order and *religious congregation* are terms which, though used promiscuously, have respective definite meanings. A religious order is one approved by the Pope as such and in which solemn vows are made. A religious congregation is one which is approved mediately or immediately by the Pope, but in which the vows made are called simple. See VOW.

CON'GREGA'TIONALISM. A term used in two significations at present. It designates a system of church organization and government, democratic in form, and rightly claimed by a great family of religious bodies, of which that popularly called "Congregational" is only one. In this usage the word appropriately describes the polity of the Baptists, the River and the Plymouth Brethren, the Christians, the Disciples of Christ, the Unitarians, and the Hebrew synagogues. It properly describes the organization of considerable groups of Adventists, American Lutherans, and less numerous religious communions, as well as of those churches specifically called by the Congregational name. But the term "Congregational" is employed no less appropriately in a second signification, to denote a particular group of churches in Great Britain, the United States, Canada, and Australia, which are "Congregational" in their

government and "Evangelical" in their type of Protestant doctrine, and stand in recognized relations of denominational fellowship one with another within the bounds of the respective countries of their location and to some extent in international fraternal union. In this sense it is proper to speak of the Congregational denomination of the United States, or of England and Wales.

The Congregational polity, in its modern history, had its origin in the Reformation age, and was due to the belief that the Bible contains an authoritative revelation of the will of God concerning church organization, no less than a God-given revelation of religious truth. In working out the details of the Congregational system its early expounders conceived that they were simply reproducing the divinely appointed model of the Apostolic churches. Few modern Congregationalists hold, however, that the minutiæ of church government are matters of revelation, or that any one form of church organization was divinely appointed for all times, countries, and stages of civilization; though Congregationalists generally believe that their polity embodies the broad scriptural principles of fraternal equality, individual responsibility, and full-rounded independent Christian manhood. They deem it, also, peculiarly consonant with the democratic tendencies and high individual intelligence of modern civil society. As indicated in the name, Congregationalism believes the basic element in the visible organized Church to be the local congregation of Christian disciples. It holds that congregation competent to designate its own officers, admit members to communion, discipline the erring, state its faith in language of its own choosing, and order its worship as seems best suited to its need. Each local congregation modern Congregationalism regards as a democracy, where affairs of concern are decided by the votes of the membership, normally under the moderatorship of the pastor—if there be a pastor in office. Like all democratic bodies, however, a Congregational church makes large use of committees, which report results rather than processes for the consideration of the body as a whole and act as the executive arms of the congregation.

Congregationalism holds to the autonomy of the local church. It rejects the judicial system of Presbyterianism, or the supervision of any form of episcopacy, as an undue interference with the rights of the local body. But Congregationalism in America, and increasingly in Great Britain, rejects pure independency. Though one church or body of Christians has no judicial authority over another, each owes fraternal counsel to its neighbors, and no act of large importance in any single congregation should be done without seeking the advice of the representatives of sister churches. Illustrated in various ways in different countries, mutual responsibility and helpfulness are distinguishing features of the Congregational polity.

The Local Church. The local church is held by Congregationalists to be a company of professed disciples of Christ, who have some intelligent acquaintance with Christian truth and personal experience of the saving work of Christ. Hence admission to church membership is based on evidence of intelligent determination to lead a Christian life. Such a company of Christians is knit together into a church by the covenant which they make with God and one with another, to live as those who have God for their Father and Christ for their Saviour, and to join in the worship, seek the welfare, and submit to the discipline of the particular local body of believers of which they are members. In early Congregationalism, and in American practice to the present day, this covenant, which each local congregation may express in whatever way seems best to it, was written; in Great Britain written covenants are now rare. In addition to a written covenant it is usual for American Congregational churches of the present day to have a brief confession of faith, assent to which is required of would-be members. Such local confessions, though not unknown, are unusual in Great Britain. Examination of candidates for membership as to their knowledge of Christian truth has prevailed since the beginnings of Congregationalism; but the local confession of faith, though occasionally exemplified in New England during the seventeenth and eighteenth centuries, attained general use in America during the doctrinal discussions of the opening years of the nineteenth century. Each local church is free to express its faith in its own language, and such confessions, like the examination of candidates for church membership, have steadily tended towards greater catholicity and simplicity. While Congregationalism recognizes no creed statement as binding on a local church save that which the church may itself adopt, Congregationalists have never hesitated, in their representative gatherings, to adopt confessions of faith. These have the value of a testimony to the common faith of the churches and have never been regarded as creed tests. Thus, the exiled London Congregationalists put forth a confession in 1596; the Cambridge Synod, representing the churches of New England, approved the doctrinal parts of the Westminster Confession in 1648. Ten years later, a meeting representative of the Congregational churches of England put forth a modified form of the Westminster Confession, known, from the place of their assembly, in the Savoy, in London, as the "Savoy Declaration"; and meetings of the delegates of the Massachusetts churches in 1680, and of those of Connecticut in 1708, set their approval, save for slight changes, on this work of the Savoy Synod. The "Congregational Union of England and Wales" put forth a statement of "Principles of Religion" in 1833; the "National Council of the Congregational Churches of the United States" adopted the "Burial Hill [Plymouth, Mass.] Declaration" in 1865; in 1883 a commission appointed by the National Council three years before reported a creed that has had wide acceptance among American Congregationalists; and in 1913 the National Council adopted a brief creed prepared by a special commission appointed by the National Council in 1910.

Doctrinal Position. The doctrinal position of early Congregationalism was that of general Puritan or Presbyterian Calvinism. It was not on doctrinal grounds that the founders of New England left their homes. They were wholly one theologically with the Puritan party of the English Civil War, with which they and the English Congregationalists were alike associated. Historically considered, American and English Congregational theological develop-

ment has been along Calvinistic lines; but, as in other Protestant bodies, the peculiar problems of seventeenth century debate have ceased to arouse interest. Calvinistic and Arminian interpretations of the way of salvation, as far as there is present significance in either interpretation, are regarded as alike acceptable. The doctrinal position of modern Congregationalism is that common Protestantism which is known as "Evangelical." Its ministry and churches, as a whole, however, while holding broadly to the system of Christian doctrine characteristic of historic Protestantism, have been more disposed in recent years than many Protestant bodies to welcome the new interpretations of Christian truth, and of its sources, which current theological discussions in Europe and America have presented.

Officers and Support. Early Congregationalism, following what was believed to be the Scripture model, held that a completely organized local church should have five classes of officers—a "pastor" and a "teacher," both of whom should preach and administer the sacraments; a "ruling elder," who should aid in church discipline, "deacons," to care for the poor and assist at the Lord's Table; and "widows," to aid in nursing among the sick. But little of this elaborateness of organization survived the end of the seventeenth century, and by that time the officers of a Congregational church had become reduced almost universally to a pastor and several deacons. The development of the nineteenth century added to these officers in practically every church a clerk, a treasurer, and a Sunday-school superintendent; and, in churches of size, a "prudential committee," to serve with the other officers as advisory to the pastor. Recently the order of deaconess was adopted. Assistant pastors are becoming efficient aids to the pastoral service. Since the cessation of teachers and ruling elders, the pastors and assistant pastors have been generally the only paid officers of Congregational churches. In the earliest Congregationalism everywhere, and in English Congregational practice always, the expenses of the church were met by some form of voluntary payment or by the rental of sittings in the place of worship. Modern American Congregationalism employs these voluntary methods exclusively. But during most of the Colonial history of New England the intimacy of relationship between church and state was such that church expenses were assessed upon the taxable property of all inhabitants not specially exempt, and such assessments were collectible like any other taxes. This continued the practice in Connecticut till 1818 and in Massachusetts until 1834. When there was but one church in a township, its pecuniary affairs were settled in the meeting of the legal voters of that township. Where two or more churches existed in the township, it was subdivided territorially into districts for voting and tax raising, known as "societies," "parishes," or "precincts." The New England feeling that there should be no taxation without the consent of those taxed led, during the last third of the seventeenth century, to the assumption by the legal voters, by whom the minister's salary was assessed and paid, of a right to concur in or reject the choice of a minister by the membership of the church, and established a dual system of entrance to the local pastorate, the election of the church requiring the confirmation of the "society." In the general usage of New England, and to some extent in other parts of the United States, this system has survived the loss of the right of public taxation for ecclesiastical purposes and prevails at the present time. The ownership of the buildings used by the church and the determination and payment of the salary to its minister remain under the control of a voluntary local legal business corporation, admission to which is secured by election, by renting sittings in the church edifice, or in a variety of ways; and this corporation, still known as the "society" or "parish," has a concurrent authority in the choice of a minister. English practice has known nothing of this institution; and outside of New England the temporalities of the church have been largely placed in the hands of trustees chosen by the membership of the church, or the church itself has held title to its property and administered its pecuniary affairs. Even in New England the "society" is falling into disuse in many places, the church itself securing the incorporation permitted by statute and assuming all the rights previously shared with the "society."

Worship. Early Congregationalism, in its sharp reaction from the imposition of a written liturgy, characteristic of the days of Elizabeth and the Stuarts, went to the extreme of rejecting all written liturgy as unscriptural. Modern Congregationalism entertains no such hostility, and a considerable degree of modification of the public services of Congregationalism, by responsive reading, united repetition of the Lord's Prayer and the Apostles' Creed, and development of the musical aids to worship, has taken place in recent years. In accordance with its fundamental principle of local autonomy, Congregationalism recognizes the full right of each local church to order its worship as it sees best. But, whatever minor modifications have taken place, Congregational worship remains essentially nonliturgical. It makes the sermon central, and includes, as it has always done, the elements of preaching, free prayer, the reading of the Word of God, and singing. Till about the middle of the eighteenth century in America, and in the early Congregational practice of Great Britain, only metrical translation of portions of Scripture were deemed appropriate to be sung in public worship, and the aid of musical instruments was rejected till about the same period; but since then full freedom in the use of hymns and musical aids has prevailed.

Fellowship between the Churches. While each congregation is autonomous, Congregationalism believes that it is the duty of each local church to consult neighboring churches in matters of importance. This feature of Congregational practice has attained a larger development in America than in England and is chiefly manifested by the "advisory councils," which American Congregationalism has employed since the time of the first settlers on New England soil. Though given a place in the theoretic exposition of early English Congregationalism, the "advisory council" of America has no exact counterpart in modern British usage. Such ecclesiastical acts as the formation of a church, the settlement or dismissal of a pastor, and the consideration of cases of discipline from which quarrel and division have

resulted, are judged by American Congregationalism to demand the advice of neighboring churches. At the request of a church, or of a party in a divided church, the representatives of neighboring churches meet in an "advisory council"—a temporary body assembled to consider the particular case. Its composition depends solely on the "letter missive" of invitation, and may be drawn from a distance, though usage regards a council, the majority of the membership of which is not from the vicinage, as seriously irregular. Its authority is not judicial, but its advice is seldom disregarded. On completing its work, an "advisory council" is dissolved, and the minutes are left with the church with which it met. No member of the council is taken from the church which calls it. The council does not report to any other organization than the church which asks its advice.

Early Congregationalism in England and America recognized the desirability of gatherings representing the communion as a whole in occasional important exigencies. Thus, the ministers and delegates of the New England churches gathered at Cambridge, Mass., in 1637, when the supposed heresies aroused by Mrs. Anne Hutchinson were considered, and again in 1646–48, when English religious politics induced them to formulate their system of church government in the "Cambridge Platform." The favor which English Congregationalists experienced from Cromwell induced an assembly at the Savoy Palace, London, in 1658, which set forth Congregational faith and practice. Besides these general gatherings, meetings of representatives of colonies and districts were held as necessity required. Massachusetts called such assemblies to consider the proper recipients of baptism in 1662 and to find remedies for the declining state of religion in 1679–80. Connecticut summoned such a gathering in the height of the excitement of the "Great Awakening" in 1741. Less formal and distinctly ecclesiastical, but nevertheless a factor of weight in the religious life of the Province, was the annual convention of ministers of Massachusetts which met, from early Colonial days, at the time of the May election.

Permanent Organizations. Local stated meetings of ministers for discussion of matters of ecclesiastical interest existed in England under the Commonwealth, and were introduced into Massachusetts in 1690. By 1705 there were five such associations in the Province, by which candidates for the ministerial office were examined and licensed; and in 1708 the system was extended to Connecticut, where, besides these local gatherings, an association representative of the whole Colony was formed that has assembled annually from 1709 to the present time. Similar State bodies were organized in Vermont in 1795, in Massachusetts in 1803, in New Hampshire in 1809, and have since extended everywhere where Congregationalism has gone in America. These State bodies are now prevailingly designated "conferences." Minor local meetings, often coextensive with county lines in their constituency, are universal in American Congregational practice. During the early part of the nineteenth century, however, the feeling was strongly manifest that these stated meetings, which were at first of ministers only, should be made really representative bodies by the admission of delegates of churches. This has been universally accomplished. In each State, and in most subdivisions of States, where Congregationalism is organized, there is now a body meeting for discussion at least once a year, and composed of the pastors and the elected delegates of the churches. The State bodies are designated prevailingly "conferences," and the smaller local bodies "associations." The pressing questions of the decade previous to the Civil War led to the gathering at Albany, in 1852, of the first convention representative of American Congregationalism as a whole that had assembled since 1648; and at Boston, in 1865, a similar representative council was held. In 1871 the "National Council of the Congregational Churches of the United States" was formed. This body has since met regularly every third year, and can hold special sessions at any time at the request of any five State organizations of churches. By a change in its constitution, adopted in 1913, it now meets biennially. Its membership is elected by the local and State bodies into which the churches are grouped, and the number of delegates chosen is proportionate to the number of local churches and of the communicants in the bodies by which they are appointed. The decisions of the National Council, like those of the smaller bodies into which the Congregational churches of the United States are grouped, are not mandatory or judicial; but the free discussion of matters of common concern, their investigation by competent committees, and the recommendation of courses of action by vote, have much weight with the churches. The churches of Canada are not constituents of this National Council, but are organized in the "Congregational Unions" of "Ontario and Quebec" and of "Nova Scotia and New Brunswick."

In the United States Congregational churches are normally united by permanent representative bodies of three kinds, the larger in a true sense superior to the smaller: (1) the local "association"; (2) the State "conference"; (3) the National Council. The usage of Great Britain is much less developed. Independency is more nearly the condition of English than of American Congregationalism. As has been pointed out, English Congregationalism does not have the "advisory council." But an approximation to the American system of mutual responsibility and helpfulness exists in the county and district associations, in which English Congregational churches have long been grouped. Some of these bodies may have come down from the days of the Commonwealth; but their modern development began in Hampshire in 1781, whence they rapidly extended over England. By these "associations," or unions, the good standing of Congregational churches and ministers is certified, church advancement is superintended, and denominational fellowship variously expressed. Besides their coöperation in these local associations, the Congregational churches of Great Britain are federated in two larger bodies—the Congregational Union of Scotland, organized in 1813, and the Congregational Union of England and Wales, formed in 1832. The semiannual meetings of the last-named assembly are the most influential events in modern English Congregational life.

The sense of mutual fellowship characteristic of modern Congregationalism has its further illustration in the formation of an "Interna-

tional Congregational Council," representative, by appointed delegates, of the churches of all lands into which Congregationalism has penetrated. Its first meeting was held at London in 1891, its second at Boston in 1899; and its third in Edinburgh in 1908.

Missionary Agencies. The benevolences of Congregationalism have called into being a large number of denominational agencies. In the United States organized home missions began with the formation of the Missionary Society of Connecticut in 1798 and the Massachusetts Missionary Society in 1799. Similar local societies have been formed in the States where Congregationalism is strongly represented, and they serve as auxiliaries to the national Congregational Home Missionary Society, founded in 1826, to which a large share, not merely of the westward extension of Congregationalism, but of the maintenance of the feebler churches in the older States, is due. A second society by which Congregational effort is carried forward within the territory of the United States, Porto Rico, Alaska, and the Hawaiian Islands, is the American Missionary Association, organized in 1846 by antislavery sympathizers, which now maintains an extensive educational and evangelistic work, chiefly among the negroes of the South, but also among the mountain whites, the Indians of the West, the Eskimos of Alaska, and the Chinese of the Pacific coast. The Congregational Education Society, founded in 1815, has for its work the strengthening of schools and colleges in the newer portions of the land, and the assistance of worthy and needy candidates for the ministry. The work of the Congregational Church Building Society and of the Congregational Sunday-School and Publishing Society is indicated by their titles. Congregational foreign missionary effort reaching forth from the United States is under the direction of the American Board of Commissioners for Foreign Missions, founded in 1810, and now carrying on work in India, Turkey, China, Japan, Micronesia, Africa, Austria, Spain, and Mexico. By an agreement effected in 1913 with these national Congregational societies for home and foreign work, the membership of the National Council is the majority membership of each, and all are under the supervision of a commission of that council. In Great Britain the work of home missions is under the charge of the Congregational Church Aid and Home Missionary Society, and that of foreign evangelization of the London Missionary Society, founded in 1795. Canadian Congregationalism has its own Foreign Missionary Society.

Theological Seminaries. In order to secure a proper training for their ministers, the early New England Congregationalists established Harvard and Yale, and the course of instruction in both of those institutions of learning was long regulated by the design of equipping men for the ministry. But by the first quarter of the eighteenth century the ordinary course of collegiate instruction was increasingly felt to be inadequate for the needs of ministerial training, and the result was the foundation at Harvard, in 1721, of the Hollis professorship of divinity, and the beginnings of a similar professorship of divinity at Yale in 1746—a professorship that was not fully established there until 1755. Even more influential in the ministerial training of the eighteenth century than the instruction of these professors was the custom, which grew into increasing prominence as the century went on, of taking a few months of training supplemental to the college course, under the guidance of some eminent pastor, before applying for ministerial licensure. Such household theological seminaries were presided over by many of the prominent pastors of New England; and among such instructors Jonathan Edwards, of Northampton, Mass.; Joseph Bellamy, of Bethlehem, Conn.; Charles Backus, of Somers, Conn.; and Nathaniel Emmons, of Franklin, Mass., were conspicuous.

The immediate cause of the establishment of theological seminaries, in the modern sense of the term, in America was the passage of Harvard College to the control of the party soon to be known as Unitarian, in 1805. Deprived thus of control of their chief seat of ministerial training, the conservative Congregationalists of eastern Massachusetts began at once to plan for separate schools of theological instruction. Two independent designs for the establishment of a theological seminary—the one begun by representatives of the older type of New England Calvinism, and the other by men of the Edwardean sympathies—were happily combined, after much effort, in 1808, and resulted, in September of that year, in the establishment of Andover Theological Seminary, at Andover, Mass. Conspicuous in the teaching force of this institution, from its foundation to his resignation in 1846, was Leonard Woods, its first professor of theology; while Moses Stuart, from 1810 to 1848, was eminent for his services in the study of the Old Testament and in introducing the theology of Germany to the knowledge of American students. Even more conspicuous as a theological leader at Andover was Edwards A. Park, who taught in the institution from 1836 to 1881 and, from 1847 to the year last mentioned, occupied its chair of theology. Andover Seminary under its first instructors occupied a theological position which represented a union on broad and generous lines of the various shades of conservative New England opinion, in opposition to the Unitarian movement of its day. Under Professor Park the Edwardean theology was even more emphasized and developed. For 30 years past Andover has been distinguished by a cordial welcome to the newer phases of theological discussion, especially as developed in Germany. In 1908, while preserving its name and separate organization, it removed to Cambridge and entered into affiliation with Harvard University.

A second theological seminary was that established at Hampden, Me., in October, 1816, but which was removed to Bangor, Me., in 1819, where it has since continued, and from which place it takes its name. Its most eminent theological instructor in the past was perhaps Enoch Pond, whose connection with it extended from 1832 to 1870.

In 1822 the corporation of Yale College—now Yale University—carried into execution a plan which had been entertained by them for a considerable time, by establishing a department of theology in the college, which has since been known as "Yale Divinity School" and is a coordinate department of Yale University. Its first professor of theology, from its foundation to his death in 1858, was Nathaniel W. Taylor,

whose type of doctrine, though belonging essentially to the historic Edwardean school, yet modified the characteristic teachings of that school in some particulars to such an extent as to receive the name "New Haven theology," and subjected its author to much criticism from the stricter representatives of the Edwardean party. Other conspicuous teachers of the Yale Divinity School have been Eleazar T. Fitch, from its foundation to 1852; Samuel Harris, professor of systematic theology from 1871 to 1895; Timothy Dwight, professor of New Testament Greek from 1858 to 1886, and president of Yale University from 1888 to 1900; and George Park Fisher, its professor of Church history from 1861 to 1901.

The differences of opinion awakened by the theology of Nathaniel W. Taylor, already alluded to, led to the foundation of a school at East Windsor, Conn., in 1834, then called the "Theological Institute of Connecticut," but much better known as "Hartford Theological Seminary" since its removal to Hartford in 1865. Its founder and first professor of theology was Bennet Tyler, who occupied its most conspicuous chair until 1857. The chief leader among its later instructors was Chester D. Hartranft, who became president in 1888, and under whom its curriculum and equipment were greatly developed. He was succeeded in 1903 by William D. Mackenzie.

Almost contemporary with the founding of the Hartford Seminary was the establishment of a theological department in connection with Oberlin College, opened under the title of Oberlin Theological Seminary, in 1835. Its most distinguished instructors have been Charles C. Finney, the eminent revivalist, whose services to it continued from 1835 to 1875; and, since his death, James H. Fairchild, who was connected with Oberlin College, as an instructor in various departments, from 1838 to his decease in 1902, and held the office of president from 1866 to 1889. Oberlin is at present distinguished by the hearty reception there given to the theology of the Ritschlian school.

The growing needs of the Middle West led to the organization, in 1854, and to the complete establishment in 1858, of Chicago Theological Seminary, an institution prevailingly conservative in its broader evangelical type of theology, of which it has long been a leader in a region which looks to Chicago as its centre. Conspicuous in its teaching force have been Samuel C. Bartlett, its professor of biblical literature from 1858 to 1877, when he became president of Dartmouth College; Franklin W. Fisk, its professor of sacred rhetoric from 1859 to his death in 1901; and George N. Boardman, its professor of theology from 1871 to 1893.

The Pacific Theological Seminary was established at Oakland, Cal., in 1869, and is now located at Berkeley, in the same State. The youngest of the Congregational theological schools was organized at Atlanta, Ga., in 1901.

The Congregational College of Canada was founded in 1830 as a "Congregational Academy," at Toronto, and was removed to Montreal in 1864, where it is now located as a theological school in affiliation with McGill University.

It will thus be seen that, of the American Congregational theological seminaries, Yale and Oberlin are departments of a university or a college; three others, Andover, Montreal, and Pacific, are affiliated or in close geographical connection with universities; and four, Bangor, Hartford, Chicago, and Atlanta, are independent foundations. While some of them originated in doctrinal discussion, and they still represent in several instances somewhat dissimilar points of view, the general tendency of modern Congregational development has been to an increasing similarity in doctrinal position and in methods of instruction, so that good fellowship instead of schism exists among all these theological seminaries at the present time.

In Great Britain, as in America, theological education has long commanded the attention of Congregationalists. Soon after the passage of the Toleration Act by the English Parliament, Congregational and Presbyterian Dissenters about London established a "fund" to aid feeble churches and to educate candidates for the pastoral office (July 1, 1690). The union of representatives of the two polities proved but temporary, and in 1695 the "fund" was divided, and a "Congregational Fund Board" organized. This board still exists. By its influence, and that of eminent Congregationalists like Philip Doddridge, many "academies" and "colleges" were organized in the eighteenth century. These had at first the twofold object of training an educated ministry and of providing a general education for lay students who were debarred from university privileges by their "dissent" from the Establishment. To some extent these two aims are still sought by the Congregational "colleges" of Great Britain; but with the removal of disabilities from the pathway of Nonconformists who are seeking a general education these "colleges" are laying increasing and in some instances exclusive emphasis on ministerial training. They correspond to the "theological seminaries" of the United States.

The Congregational "colleges" of Great Britain, at the present time, are the following: 1. *New College*, London, tracing its origin to 1696 and now affiliated with the University of London. 2. *Western College*, Bristol, founded as the Western Academy, in 1752. 3. *Yorkshire United Independent College*, Bradford, dating from 1756. 4. *Cheshunt College*, Cheshunt, founded by the Countess of Huntingdon at Talgarth in 1768 and now affiliated with the University of London. 5. *Hackney College*, founded by Rev. Matthew Wilks and Rev. George Collison at Hackney in 1803 and now at Hampstead. It is affiliated with the University of London. 6. *Lancashire Independent College*, Manchester, founded at Blackburn in 1816. 7. *Mansfield College*, Oxford, founded as Spring Hill College at Birmingham in 1838 and greatly strengthened by its significant re-establishment at Oxford in 1886. 8. The *Congregational Institute*, Nottingham, opened in 1861. 9. The *Congregational Memorial College*, Brecon, combining a number of institutions, the oldest of which dates from 1755, and giving special attention to Welsh students. 10. *Bala-Bangor Independent College*, Bangor, dating from 1843 and largely Welsh in its constituency. 11. The *Theological Hall of the Congregational Churches in Scotland*, Edinburgh, tracing its origin to the Congregational Academy founded at Glasgow in 1811. Congregational students are also supported by separate funds in the *Presbyterian College* at Carmarthen.

History. Modern Congregationalism had its rise in the discussions consequent upon the Eng-

lish Reformation. Its earliest advocates may properly be described as forming the radical wing of English Puritan Protestantism. But, besides the characteristics which they shared with the Puritan party, they showed several non-Puritan peculiarities. They denied the existence of a national church; they denied that church membership belonged to all baptized inhabitants of the kingdom; they held each church competent to regulate its own affairs. These peculiarities are so similar to those of the Continental Anabaptists, that some influence from Anabaptist sources in Congregational beginnings seems probable; but the dissimilarities existing between Anabaptists and Congregationalism are so considerable that this influence must have been indirect and unconscious. The founders of Congregationalism thought they were simply reproducing the system of the New Testament. Though a church essentially Congregational in organization existed in London as early as 1567, Congregationalism first came to significance in the work, and especially in the writings, of an erratic but earnestly reformatory young graduate of Cambridge, Robert Browne. Convinced that reforms such as he desired were unattainable within the Establishment, Browne organized a Congregational church at Norwich in 1580 or 1581. Compelled to seek refuge in Holland, Browne put forth several tracts in 1582, in which he urged the duty of immediate separation from the Church of England—a characteristic that gave the name "Separatists" to these early Congregationalists. He also set forth Congregational principles with great distinctness. By 1587 Congregational preaching by Henry Barrowe, a London lawyer, and John Greenwood, like Barrowe a Cambridge graduate, had gathered a following in London and brought upon its teachers and disciples the hostility of the government. The organization of a Congregational church in London, in 1592, was followed by the martyrdom, by hanging, of Barrowe, Greenwood, and John Penry, in 1593, and the exile of the greater portion of its membership, who found a home in Amsterdam, with Francis Johnson as their "pastor" and Henry Ainsworth as their "teacher."

Meanwhile a movement to secure earnest Puritan preaching was begun, about 1590, in the country region of their residence some 150 miles north of London, by Richard Clyfton, rector of Babworth, and William Brewster, a layman of Scrooby. Ecclesiastical opposition deepened the movement into Separation, and it was stimulated by the coming of Rev. John Robinson, in 1604, and Rev. John Smyth, apparently the following year. Churches were formed on the Congregational model at Scrooby and Gainesborough, probably in 1606, though the year is uncertain. Governmental opposition compelled both to seek refuge in Holland, and that of Scrooby, with Robinson as its "pastor" and Brewster as its "ruling elder," found a home at Leyden in 1609. Thence a minority of its membership emigrated to New England in 1620, founding Plymouth, now in Massachusetts, in December of that year. Here the Separatist colony passed through severe struggles successfully under the leadership of Brewster, and with William Bradford, Edward Winslow, and Myles Standish as its foremost men in civil affairs.

This "Pilgrim" emigration, as it was called, was Separatist, and Plymouth Colony numbered only about 300 in population by the close of its first decade. It would have amounted to little had it not been unexpectedly and greatly reinforced. The policy of Charles I impelled English Puritans to seek new homes across the ocean, and the result was the establishment of a Puritan colony at Salem in 1628. Acquaintance with the Plymouth Separatists brought recognition of the large similarity of their views, and when a church was formed at Salem, in 1629, it was organized on the Congregational model. The example thus set was followed in the formation of the succeeding Massachusetts churches. The flood tide of Puritan immigration ran strong till the political situation altered in England in 1640; and it brought to New England such men as John Winthrop in 1630, Rev. John Eliot in 1631, Rev. John Cotton in 1633, and Rev. Richard Mather in 1635, giving to Massachusetts a strong and numerous Congregational population. Slightly divergent views regarding the extent of the franchise, combined with an ardent desire to secure a fertile territory, and more personal motives, led emigrants from Massachusetts, under Rev. Thomas Hooker and John Haynes, to settle in Connecticut in 1634–36; and in 1638 another company, under Rev. John Davenport and Theophilus Eaton, founded New Haven. In 1643 the four Congregational colonies united in a confederacy for mutual protection.

The settlement of New England was followed by a time of planting and developing institutions. The right to vote was restricted in Massachusetts to church members from 1631 to 1664 and in New Haven from 1639 to 1665. No such limitation ever obtained in Plymouth or Connecticut colonies. Schools received the early attention of the settlers, and the founding of Harvard in 1636, followed by the establishment of Yale in 1701, bore witness to the desire for a learned ministry always characteristic of Congregationalism, and were evidences of that interest in education which marks the denomination to the present day. Congregational polity was expounded in treatises by Cotton, Hooker, and Mather, and authoritatively defined by the Cambridge Synod in 1648. Missionary labors among the Indians, begun in 1646 by John Eliot in Newton, Mass., and by Thomas Mayhew on Martha's Vineyard, were considerably successful, resulting, by 1674, in six churches, and bringing about 4000 savages in some measure at least under the influence of the gospel, though these results were robbed of permanance by the dying of the Indian race. The chief intellectual monument of this missionary activity is Eliot's Indian version of the Bible of 1663. The most important internal discussion of seventeenth-century New England Congregationalism was that regarding the "Half-Way Covenant"—the question being whether persons who had themselves been baptized in infancy because of their parents' church membership could in turn bring their own children to baptism when they themselves were subjects of no conscious regenerative change. The decision of a meeting of Massachusetts and Connecticut ministers at Boston in 1657, and of a convention of the Massachusetts churches in 1662, was that such baptized, but not consciously regenerate, parents could bring their children to baptism and transmit the church status they themselves possessed, but

could not come to the Lord's Table or vote in church affairs. Hence the nickname "half-way." Though never universally adopted, the "Half-Way Covenant" was practiced by most New England churches till about the opening decade of the nineteenth century.

Though the majority of the Puritan party in England remained Presbyterian during the seventeenth century and controlled the Westminster Assembly, English Congregationalism had five sturdy champions in that convention; and in the army, as well as among the people as a whole, it grew in favor as the struggle against the King continued. Under the sympathetic rule of Cromwell it reached its widest extension in seventeenth-century England. After the Restoration it suffered the disabilities imposed on Dissenters in general, until partially relieved by the Toleration Act of 1689. Yet, in spite of the labors of such men as Isaac Watts and Philip Doddridge, and the founding of "academies" for ministerial as well as general training, the course of English Congregationalism in the eighteenth century, like the religious life of England as a whole, was one of spiritual decline, until awakened by the new spiritual impulse that came forth from the great Wesleyan revival. Quickened thus, the Congregational churches of England grew in numbers throughout the latter half of the eighteenth century, awakened to fresh zeal for missionary service at home, and a new interest in missions abroad, and became increasingly conscious of their denominational unity and desirous that that unity should find expression.

In America the latter half of the seventeenth and the three opening decades of the eighteenth century saw a steady decline of the spiritual enthusiasm in which the churches of New England had been planted. New England life grew provincial in every respect. From this state of relative decadence the churches of New England were powerfully aroused by a series of "revivals" beginning at Northampton, Mass., under the ministry of Jonathan Edwards in 1734, and extending throughout New England in 1740–42, in connection with a visit of Rev. George Whitefield. The movement, known as the "Great Awakening," stirred the spiritual life of the churches profoundly, but was so accompanied by physical demonstrations and other evidences of excitement as to lead to much division of judgment as to its merits. Partly owing to this division, and partly in consequence of the distraction accompanying the struggle for the political possession of Canada and for American independence, the "Great Awakening" was followed by a period of comparative religious inactivity, lasting till about 1790.

The second half of the eighteenth century, however, witnessed the rise of a native modification of the historic Calvinistic theology—the "New England Theology"—under the leadership of Jonathan Edwards, father and son, of Samuel Hopkins, Joseph Bellamy, and Timothy Dwight. This theology won its way gradually and by 1800 was dominant in Connecticut and Vermont and largely represented in the rest of New England. Parallel to this Edwardean development, though with much smaller following, there ran a "Liberal" movement, represented especially in eastern Massachusetts, and corresponding to similar modifications of doctrine among the Dissenters, especially those of Presbyterian lineage, in England. This "Liberal" theology, already manifest in the preaching of Jonathan Mayhew and Charles Chauncy before the American Revolution, was little discussed during the excitement of that struggle; but when doctrinal debate again attracted attention and was stimulated by a great series of "revivals," beginning about 1790, it was found that a considerable number of Congregational churches had drifted out of sympathy with historic Christianity. Under the lead of men of ability like William Ellery Channing, the "Liberal" movement strengthened, while the cleavage between it and more conservative Congregationalism grew to separation. The year 1815, when "Unitarian" became the popular designation of the new "Liberal" denomination, may be assigned as the approximate date of the schism; though Harvard College had come under the recognized dominance of the "Liberal" party in 1805. The Unitarian division was almost strictly local, but wholly or partially involved about one-tenth of the Congregational churches then existing in the United States. The loss of Harvard College as an agency for ministerial training led the conservative majority of the churches to seek new methods of ministerial education. As a result, theological seminaries were opened at different places and times. See section *Theological Seminaries.*

Congregationalism entered Canada by way of Nova Scotia in 1753. There was a feeble church in Newfoundland as early as 1645, which died and was not revived, and Congregationalism did not reappear there until 1775.

The beginning of the nineteenth century was marked by a rapid broadening and deepening of the activities of American Congregationalism. The rise of home and foreign missions has already been indicated in speaking of the benevolent agencies of Congregationalism. With the settlement of the West, Congregationalism ceased to be confined to New England and the adjacent sections of New York. Its spread was at first slow, because of a distrust engendered by the Unitarian schism, as to its adaptability to meet frontier conditions, and a lack of denominational consciousness which led to ready affiliation with Presbyterianism. But through the efforts of men like Rev. Dr. Leonard Bacon, of New Haven, denominational consciousness was awakened; and, from the fourth decade of the nineteenth century, the planting of distinctly Congregational churches and colleges in the West has gone rapidly forward. This westward extension was greatly aided by the Albany Convention of 1852. After the Civil War Congregationalism entered the South, but has never had a relatively large following in that section of the United States.

Congregationalism during the nineteenth century has witnessed a gradual theological development. The Edwardean school was ably carried on in somewhat divergent directions by Nathaniel W. Taylor at Yale and by Edwards A. Park at Andover. By the middle of the century the influence of Horace Bushnell was becoming felt in a direction away from the Edwardeanism then dominant; and the last three decades have seen increasing welcome given to what is popularly termed "The New Theology." This tendency has met with strenuous opposition; but the division of feeling has at no time been sufficient really to threaten

the denomination with schism. Nineteenth-century American Congregationalism has had its conspicuous preachers in abundance, of whom Lyman Beecher and his son, Henry Ward Beecher, Charles G. Finney, and Richard Salter Storrs may be mentioned as illustrations. It has been ready to adopt new methods of Christian work—its most successful recent contribution being the "Young People's Society of Christian Endeavor," founded by Rev. Francis E. Clark in 1881. Its spirit is warmly missionary, and it desires to coöperate broadly with all who are trying to advance the Redeemer's Kingdom.

English Congregationalism during the last century has been marked by much the same traits; but its existence in the face of an ecclesiastical establishment has led it to emphasize the characteristic principle of independence more proportionately than American Congregationalism. Its struggle has been largely one for equality of privilege in education and exemption from disabilities. Its most important recent educational foundation is Mansfield College, Oxford, of which Rev. Dr. A. M. Fairbairn was principal from its opening in 1886 to 1909. The same tendencies to express denominational unity in organizations for mutual helpfulness have been manifest in England as in America, though in less marked degree. Their illustration in county associations and in larger unions has already been mentioned.

Statistics. The total number of Congregational churches in America in 1645 appears to have been 53. About 120 English Congregational churches were represented in the Savoy Convention of 1658. In 1760 Rev. Dr. Ezra Stiles

CONGREGATIONALISM IN 1912–13 (BASED ON STATISTICS IN THE "YEAR BOOK" OF 1913)

COUNTRIES	Churches Chapels and Stations	Members	Sunday-School Scholars
England and Wales	4,732	452,489	652,751
Scotland	216	35,991	35,148
Ireland	77	2,242	4,767
Channel Islands	11	420	499
Nova Scotia	26	752	651
New Brunswick	8	336	98
Quebec	30	2,802	2,160
Ontario and Northwest	143	8,351	5,289
American Zulu Mission	26	2,406	2,225
British Guiana	55	4,448	4,171
China	4	606	342
India	41	5,215	360
Jamaica	48	3,354	1,635
Japan	103	16,105	7,524
Natal	51	1,419	1,320
Newfoundland	16	331	362
New South Wales	85	5,283	8,007
New Zealand	44	3,799	4,755
Queensland	48	2,290	4,012
Sierra Leone	17	695	574
South Australia	84	5,133	5,044
Syria	1	83	
Tasmania	47	968	1,654
Victoria	91	4,097	7,223
West Australia	44	1,429	2,427
West and South Africa	384	20,513	9,170
United States	6,064	743,026	675 677

and not far from 100,000 communicants. The most recent statistics available (1912, in the *Year Book* of 1913) give the churches of the United States as 6064, ministers as 5944, members as 743,026, and Sunday-school enrollment as 675,677. Their benevolent contributions were $2,363,584, and their home expenditures $9,307,618. The eight Congregational seminaries in the United States had, in 1912–13, 489 theological students. The churches and preaching stations of Great Britain numbered 5036, ministers and local preachers 7752, and church members 491,142. Canada and Newfoundland reported 223 churches and preaching stations, with 12,572 members. Congregationalism in Australia and New Zealand counts 443 churches and preaching stations, with 22,999 members.

The foreign missionary activities of the United States and Canada in 1912–13 were represented by 615 missionaries, assisted by 4993 native laborers, carrying on missions in 113 foreign stations, with 629 churches organized, and an enrollment of 83,152 communicants, of whom 3625 had been added during the previous year. Statistics for the London Missionary Society, through which the outreaching work of the English Congregational churches is maintained, show that during 1912–13 it employed 474 missionaries, assisted by 7262 native laborers, in 97 stations, and ministering to 84,071 communicants, of whom 2144 were received during the year then closing.

Bibliography. The student who wishes to investigate the history of Congregationalism thoroughly will look for guidance to the bibliography of 7250 titles of publications relating to Congregationalism issued between 1546 and 1879, which was given by Rev. Dr. H. M. Dexter as an appendix to his *Congregationalism of the Last Three Hundred Years* (New York, 1880). So closely is Congregationalism interwoven with the origins of New England that any good history of New England gives much regarding its spread and workings. General sketches of American Congregationalism are those of Rev. Dr. A. E. Dunning, *Congregationalists in America* (New York, 1894); and Prof. Williston Walker, *A History of the Congregational Churches in the United States* (ib., 1894). The characteristics of Congregational religious life are treated by Rev. Dr. George Leon Walker, *Some Aspects of the Religious Life of New England* (Boston, 1897). The reader specially interested in the beginnings of Congregationalism will be aided by the work of Rev. Dr. Dexter, above cited; also, John A. Goodwin, *The Pilgrim Republic* (ib., 1888); Rev. Dr. John Brown, *The Pilgrim Fathers of New England* (London and New York, 1895); Prof. Edward Arber, *The Story of the Pilgrim Fathers* (London, 1897); Rev. Dr. Fred. J. Powicke, *Henry Barrow, Separatist* (ib., 1900). Henry M. and Morton Dexter, *The England and Holland of the Pilgrims* (Boston, 1905); Champlin Burrage, *The True Story of Robert Browne* (Oxford, 1906);

English Congregationalism (London, 1907). The five volumes of Rev. Dr. John Waddington, *Congregational History* (London, 1869–78; new ed., 1880), treat the story at much length to the date last mentioned. Contemporary English Congregationalism is well discussed by Rev. Dr. A. H. Bradford, *The Pilgrim in Old England* (New York, 1893). The story of Scotch Congregationalism is well and briefly told by Rev. James Ross, *A History of Congregational Independency in Scotland* (Glasgow, 1900).

The main documents relating to the polity and beliefs of Congregationalism are collected by Prof. Williston Walker, *The Creeds and Platforms of Congregationalism* (New York, 1893). Brief manuals of its usages are those of a committee of the National Council, entitled *The Council Manual for a Congregational Church* (Boston, 1896); of Rev. George M. Boynton, *The Congregational Way* (ib., 1902); and of the Rev. Asher Anderson, *Congregational Faith and Practice* (ib., 1906). For matters relating to national councils, consult the works of Rev. E. Lyman Hood, *The National Council of the Congregational Churches of the United States* (Boston, 1901), and of Rev. Asher Anderson, *National Council Digest* (ib., 1906). English and American Congregational statistics are given in their respective *Year Books*.

CONGREGATIONAL METHODIST CHURCH, THE. A body formed in May, 1852, in Monroe Co., Ga., by ministers and laymen who had withdrawn from the Methodist Episcopal church and wished to establish a church with Methodistic doctrines, but giving the people a voice in their own government. In 1852 the first district conference was held and a Book of Discipline adopted; in 1855 the first general convention was held. Since 1881 many churches have joined the Congregational body, and in 1913 the Congregational Methodists reported 333 churches and 15,529 members. In government it is not strictly Congregational, since it has semiannual district conferences, annual State conferences, and quadrennial general conferences, and it is admissible to carry an appeal from one to another. It admits both white and colored persons, the latter being separately organized. A publishing house is maintained at Ellisville, Miss. The official organ is *The Messenger*. The only educational institution under the auspices of the denomination is the Atlanta Bible School. Consult *Religious Census of the United States* (1910).

CONGREGATION OF CLUNY. See CLUNIACS.

CONGREGATION OF THE HOLY CROSS. See HOLY CROSS, CONGREGATION OF THE.

CONGREGATION OF THE MISSION. See LAZARISTS.

CON'GRESS (Lat. *congressus*, conference, from *congredi*, to meet together, from *com-*, together + *gradi*, to step). In international affairs, an assembly either of sovereign princes or of delegates of sovereign states for the purpose of considering matters of common interest. In the United States, where the term has now a specific meaning as applied to the National Legislature (see UNITED STATES), it had a similar origin, the first Congress being that of the delegates from the various British Colonies, who met on Oct. 7, 1765, for the purpose of considering their grievances. Previous to signing a treaty of peace, a meeting of plenipotentiaries usually takes place, to which the name of a congress is sometimes applied, though the term seems more properly to be reserved for those more important meetings at which extensive schemes of future policy are determined. The period of secular diplomatic congresses opened with the Congress of Münster and Osnabrück, which closed the Thirty Years' War by the Peace of Westphalia in 1648 (q.v.). Since then, omitting those diplomatic bodies whose object was simply to arrange terms of peace at the close of a war, the most important European congresses have been those of Vienna (1814–15), Paris (1856), Berlin (1878), and the International Peace Conference at The Hague (1899). An international "Pan-American" congress, to discuss industrial and commercial questions, was held at Washington, from October, 1888, to April, 1890. In the winter of 1901–02 a similar congress assembled at Mexico and discussed at great length the question of international arbitration. The international conference at Algeciras that defined the attitude of the Great Powers towards Morocco was held in 1905. See BERLIN, CONGRESS OF; PARIS, TREATIES OF; VIENNA, CONGRESS OF.

CONGRESS, UNITED STATES. The legislative branch of the Federal government of the United States. It was instituted by the Constitution, which prescribes its membership and defines its powers. It has no general legislative power, such as is enjoyed by the British Parliament and, in a lesser degree, by the legislatures of the several American States; but it has only such functions and authority as the Constitution, expressly or by necessary implication, has conferred upon it. Acting in conjunction with the President and the Federal judiciary, it exercises the sovereign power of the people of the United States in so far as that power has been committed to the central government.

Congress is composed of two "houses," or chambers—a Senate and a House of Representatives. It is not, however, as is generally assumed to be the case, modeled upon the British Parliament, with its House of Lords and House of Commons, nor is its bicameral form due to any general agreement on the part of the framers of the Constitution that that type of legislature was theoretically preferable to a legislature of a simpler type. The Continental Congress, under whose direction the War of the Rebellion was waged, had after the adoption of the Articles of Confederation, as before, only a single chamber. But this was not of a popular character, and it is not the House of Representatives, but the Senate, which represents it in the present Congress. These first American congresses represented not the people of the Colonies and States, but the Colonies and States themselves, and it was to preserve the weight and dignity of the States among themselves, and especially of the smaller and less populous States as against the larger and more influential ones, that the Senate was instituted as a counterweight to the popular branch of the National Legislature.

The Senate is composed of two Senators from each State, and its membership has accordingly varied from 22 in the first Congress (when 11 States constituted the Union) to 96 at the present time (1914). The Constitution, as amended in 1913, prescribes that Senators shall be chosen by the people of the several States for a term of six years, and constitutes them a permanent and continuing body by pro-

viding a method of classification, whereunder the term of one class shall continuously overlap that of another, the terms of one-third of the members expiring every two years. Senators must be 30 years of age and residents of the State for which they shall be chosen. The presiding officer of the Senate is the Vice President of the United States, but he has no part in its deliberations and no vote unless the Senators are equally divided. The rule of the Congress of the Confederation which preceded the Constitution, that the voting should be by States, each State represented having one vote, was not retained in the creation of the Senate, it being provided by the Constitution that each Senator shall have an individual vote. Senators receive a compensation fixed by Congress, of $7500 a year, with a small allowance for stationery and mileage.

The House of Representatives is not a permanent or continuing body, but its entire membership is renewed simultaneously every second year. Its members are chosen by popular vote, and it is provided that they shall be apportioned among the several States included in the Union according to their respective numbers. The Constitution, as adopted, provided that for the purpose of apportionment the population of a State should be determined by adding to the whole number of free persons three-fifths of the whole number of slaves. The basis of apportionment fixed by the Constitution for the first enumeration was one Representative for every 30,000 inhabitants, with the proviso that each State should have at least one Representative. The first House numbered 65, and successive enumerations and apportionments have varied the number of Representatives as follows: in 1793, 105; 1803, 141; 1813, 181; 1823, 213; 1833, 240; 1843, 223; 1853, 233; 1863 (during the Civil War), 243; 1873, 293; 1883, 325; 1891, 357; 1901, 386; 1910, 435. The basis of apportionment under the thirteenth census (1910) is one Representative to every 212,407 inhabitants. This furnishes the following representation for the several States:

Alabama	10	Nebraska	6
Arizona	1	Nevada	1
Arkansas	7	New Hampshire	2
California	11	New Jersey	12
Colorado	4	New Mexico	1
Connecticut	5	New York	43
Delaware	1	North Carolina	10
Florida	4	North Dakota	3
Georgia	12	Ohio	22
Idaho	2	Oklahoma	8
Illinois	27	Oregon	3
Indiana	13	Pennsylvania	36
Iowa	11	Rhode Island	3
Kansas	8	South Carolina	7
Kentucky	11	South Dakota	3
Louisiana	8	Tennessee	10
Maine	4	Texas	18
Maryland	6	Utah	2
Massachusetts	16	Vermont	2
Michigan	13	Virginia	10
Minnesota	10	Washington	5
Mississippi	8	West Virginia	6
Missouri	16	Wisconsin	11
Montana	2	Wyoming	1

It is further provided by the Constitution that Representatives shall be at least 25 years of age and residents of the States in which they are chosen. They receive an annual salary, determined by Congress, the amount of which at present is $7500. The House of Representatives chooses its own presiding officer, called the Speaker, from among its members. He receives a salary of $12,000. In the process of time this has become an office of great power and importance, ranking, perhaps, next after that of the President in influence and authority. This aggrandizement of the Speaker of the House of Representatives has resulted from the control over legislation, which, as the leader of the dominant political party in the House and under the committee system which has come to prevail in Congress, he has gradually acquired. He does not, upon becoming Speaker, lose his right to vote or otherwise to participate in the proceedings of the House.

Under the Constitution the two houses of Congress have in most respects an equal voice in legislation, the only important exception being the requirement that all revenue bills shall originate in the popular branch of the Legislature. Each house is made the sole judge of the elections, returns, and qualifications of its own members, though the times, places, and manner of holding elections for Senators and Representatives are left to the legislatures of the several States, until provided for by law of Congress.

The ample legislative powers of Congress, which are enumerated in Sec. 8 of Art. I and Sec. 3 of Art. IV of the Constitution (q.v.), are limited by the veto power of the President. Every bill intended to have the force of law must be submitted to him, after passing the two houses separately, and, if vetoed by him, will fail to take effect, unless passed a second time and by a two-thirds vote of each house. If any bill shall not be returned by the President within 10 days after it shall have been presented to him, it shall become a law in like manner as if he had signed it, unless its return be prevented by the adjournment of Congress. The Constitution provides for an annual meeting of Congress on the first Monday in December unless a different date is duly appointed by law. The President is empowered by the Constitution to call an extra session of Congress or of either house.

In addition to their legislative powers, each of the two houses of Congress is endowed by the Constitution with important functions in the government. The House of Representatives has the sole power of impeachment, and the Senate the exclusive authority to try impeachments. In addition to this, the Senate exercises, in conjunction with the President, important executive powers in the ratification of treaties and in the confirmation of his appointments to all important offices of the government, including the members of his cabinet, the judges of the Supreme and other Federal courts, and even officers of the army and navy.

The large increase in the number of Representatives and the growth in volume and complexity of the matters with which they have to deal have necessitated the reference of all bills to standing committees. These conditions have made it impossible for the House to give deliberate consideration to any but the most important measures of legislation, and it follows that the real process of legislation—the discussion, the sifting, the shaping of bills—is done mainly in the committee rooms. The committees, therefore, being deliberately made up with reference to the carrying out of party policy, have acquired virtual control over the legislation of the House, their action on bills submitted to them being usually final and conclusive.

The "committee system," as it is called, was

adopted by the House of Representatives at an early period of its history. The members of the 57 standing committees are chosen by the majority and minority parties in caucus, subject to the approval of the House. These committees vary in size and are made up of members of all parties, the dominant party having an effective majority in each. The principal committees of the House are those on Rules, Appropriations, Ways and Means, Foreign Affairs, Judiciary, Commerce, Elections, Military Affairs, and Naval Affairs. The Senate, because of its smaller membership and its tradition of dignity and deliberation, has to a larger extent than the House retained the character of a deliberate assembly, and a much larger part of the work of legislation is still actually performed by it. It has also adopted the committee system; but its committees perform the more legitimate function of sifting and shaping the bills for their more convenient consideration by the Senate. They are appointed by vote of the Senate and, like those of the House, hold office during the life of the Congress for which they are chosen. The most important of the Senate committees is that on Foreign Affairs, though those on Appropriations, Ways and Means, the Judiciary, and on Military and Naval Affairs, also play an important rôle in shaping legislation. For a history of the United States Congress, see UNITED STATES.

The leading authorities on the position of Congress in the American scheme of government are: Woodrow Wilson, *Congressional Government* (Boston, 1885), and Bryce, *The American Commonwealth* (London, 1893). See also the authorities referred to in CONSTITUTION OF THE UNITED STATES.

CONGRES'SIONAL CEMETERY. A handsome cemetery near Washington containing monuments to such members of Congress as have died during their terms of office. See WASHINGTON.

CONGRESSIONAL LIBRARY. See LIBRARY OF CONGRESS.

CONGRESSIONAL RECORD. The journal of the United States Congress. Up to 1799 the Senate sat with closed doors, and no reports of its proceedings were published. Since that time an official record of the proceedings of each house is required to be published. The so-called "executive sessions" of the Senate are secret. The journal now known as the *Congressional Record* was called from 1789 to 1824 the *Annals of Congress;* from 1825 to 1837 the *Register of Debates;* from 1834 to 1874 the *Congressional Globe.* Since 1875 its present name has been used. The *Record,* however, is not an accurate transcript of the actual proceedings. Members are allowed to revise their remarks before they appear in type; and they also frequently receive from the House "leave to print" speeches which they have never delivered, but which appear in the *Record* as though a part of the proceedings of the session.

CONGRESSMAN AT LARGE. A member of the United States House of Representatives elected by the voters of the entire State, and not, as is customary, by those of congressional districts. Such Congressmen are elected under the apportionment acts of Congress, and the election of a Congressman at large is merely a device adopted to give each State the proper number of representatives under the acts until the State should be redistricted. Some States have had two such members, and several one. According to a congressional Act of 1911, the ratio of congressional representation is one Representative for every 212,407 of the population.

CONGREVE, kŏn'grēv, RICHARD (1818–99). An English philosophical writer and essayist, born at Leamington. He studied under Arnold at Rugby and afterward at Wadham College, Oxford, of which he became successively scholar, fellow, and tutor, but resigned after having become definitely a disciple of Comte. In 1855 he published a good edition of Aristotle's *Politics* (1855). Among his other publications are: *The Roman Empire of the West* (1855); *The Catechism of Positive Religion,* trans. from Comte (1858; 3d ed., 1891); *Elizabeth of England* (1862); *The Irish Crisis* (1881); *Historical Lectures* (1902). He was early one of the foremost exponents of English Positivism.

CONGREVE, WILLIAM (1670–1729). A brilliant English dramatist. He was born at Bardsley, Yorkshire, and educated at Kilkenny, and at Trinity College, Dublin. He returned to England and was entered at the Middle Temple, but did not take kindly to law. His first publication was a novel, entitled *Incognita,* really a dramatic intrigue put into narrative. His first play, *The Old Bachelor,* was produced at Drury Lane in January, 1693, and its success was remarkable. In November he brought out *The Double-Dealer,* which was a comparative failure; but his comedy, *Love for Love,* performed in 1695, was a great success and brought to its author money and fame. *The Mourning Bride,* a blank-verse tragedy, was acted in 1697. Its success exceeded even that of his comedies, but it has long since been forgotten. Three years after, he produced a comedy, entitled *The Way of the World,* which failed completely and disgusted him with the theatre. In other respects Congreve was a fortunate man. He held various offices, which together yielded him an income of £1200. Congreve affected to despise his theatrical triumphs and cultivated the manners of the fine gentleman—an eccentricity which laid him open to rebuke when he was visited by Voltaire. In his later days he was afflicted with gout and blindness. He died in London, 1729, and was buried in Westminster Abbey. As a comic dramatist, Congreve has been variously estimated. He was gross, but his age was gross. His plots are intricate, but they were so intended. His world is composed of wives, gallants, and husbands—and the husbands are hoodwinked. The characters have no heart, no generosity, but they play their parts brilliantly. Indeed, the wit of Congreve's dialogue is unsurpassed in our later drama. Famous essays on Congreve and the art he represents are: Hazlitt, *Lectures on English Poets and English Comic Writers* (London, 1846); Lamb, "On the Artificial Comedy of the Last Century," in *Essays of Elia* (ib., 1875); Leigh Hunt, critical notice, prefixed to *The Dramatic Works of Wycherley, Congreve,* etc. (1849), which he edited; Macaulay, review of Hunt, entitled *Comic Dramatists or Leigh Hunt* (London, 1848). Consult: Congreve's *Comedies,* ed. Ewald (London, 1887); id., ed. Street (ib., 1895); Gosse, *Life of Congreve* (ib., 1888), which contains a bibliography by J. P. Anderson, and "William Congreve" (New York, 1913), selected plays edited by William Archer in *Masterpieces of the English Drama Series.*

CONGREVE, Sir William (1772–1828). An English engineer, the inventor of the Congreve rocket (1805). (See Artillery.) He was educated at Trinity College, Cambridge, received a commission in the artillery, and became controller of the Royal Laboratory at Woolwich. He became a member of Parliament for Gatton in 1812 and later for Plymouth in 1820. His invention brought him many honors and the friendship of George IV.

As a result of Congreve's invention, rockets with a head forming a projectile became part of the equipment of the British army, and, though later supplanted by the Hale rocket, the Congreve rocket was used as late as 1860. There were four general types—a three-pounder, six-pounder, 12-pounder, and 24-pounder. The rocket was formed by a case of sheet iron to which was secured a cylindrical conical head forming the projectile, and the latter, being hollow, could be filled with a bursting charge, if desired, with a fuse ignited by the main charge of the rocket. At the lower end of the iron case which carried the rocket charge there was a base provided with vents and a socket for a stick. The rocket was fired from rocket tubes mounted on a tripod. These rockets were large and heavy, and, while they did little direct damage, by their brilliancy and noise in flight when first introduced they exercised an important moral effect. The Congreve rocket was invented about 1805 and was used as early as 1807. On several occasions these rockets were fired against the French fleet, and at the battle of Leipzig they served to frighten the French and throw a portion of them into confusion, but otherwise did no damage.

Sir William Congreve is also famous for a celebrated and ingenious attempt to realize perpetual motion, based on the capillary action of water and absorbent material such as a sponge, which was mounted on an endless band passing over an inclined plane. This was surrounded by a band of links of lead which served to squeeze out the water from one side after it was absorbed on the other. His publications include: *The Congreve Rocket System* (1807; Ger. trans., 1829); *Mounting of Naval Ordnance* (1812); *Description of the Hydropneumatical Lock* (1815); *A New Principle of Steam Engine* (1819).

CON'GRUENCE (Lat. *congruentia*, from *congruere*, to agree). In geometry, plane figures which can be superposed so as to coincide throughout are said to be congruent. This is the Euclidean definition of equality and indicates both equality of area and similarity of form. The symbol $\cong$ for congruence signifies these two properties, being composed of the old letter *s* for (*similis*) and the sign of equality. The symbol is more common in Germany than elsewhere. In general it is not necessary actually to superpose the figures. If the equality of certain parts is known, the equality of the other parts can be established; e.g., if two sides and the included angle of one triangle are equal to the corresponding parts of another, the triangles are congruent, since the remaining parts are also equal and similarly placed. Congruence is related to axial and central symmetry (q.v.) and constitutes an important theory of geometry. Congruency, in modern geometry, relates to a system of elements satisfying a twofold condition. Of all possible lines, those particular lines which satisfy a given condition are together called a complex, and those which satisfy two conditions are called a congruency; e.g., all lines which intersect a given circle form a complex, and all which intersect two given circles form a congruency. The order of a congruency is the number of its rays coplanar with a given plane; the class of a congruency is the number of its lines concurrent in a given point.

In the theory of numbers two integers are said to be congruent with respect to a third, called the "modulus," when their difference is exactly divisible by the modulus. Thus, 12 and 7, 27 and 12, are congruent with respect to 5 as a modulus, since (12—7) and (27—12) are divisible by 5. This relation is expressed thus: $12 \equiv 7 \pmod 5$, $27 \equiv 12 \pmod 5$, and, in general, $a \equiv b \pmod c$. When two integers are congruent with respect to a third, either is called the residual of the other with respect to this modulus. A few fundamental theorems of congruences are: (1) If $a_1 \equiv a'_1$, $a_2 \equiv a'_2$, . . . $a_n \equiv a'_n$ (to the same modulus), then $a_1 + a_2 + \ldots a_n \equiv a'_1 + a'_2 + \ldots a'_n$. (2) If $a \equiv a'$, then $na \equiv na'$. (3) If $a \equiv a'$, $b \equiv b'$, then $ab \equiv a'b'$. (4) If $a \equiv a'$, then $a^n \equiv a'^n$. (5) If $a_1 \equiv a'_1$, $a_2 \equiv a'_2$, . . . , then G $(a_1, a_2, \ldots) \equiv$ G $(a'_1, a'_2, \ldots)$, G designating any rational integral function of $a_1, a_2, \ldots$.

In algebra the congruence of functions is considered in addition to the congruence of numbers. When the elements considered are of the form $ax + b$, the congruence is called linear. When the elements are of the form $ax^2 + bx + c$, the congruence is called quadratic, and so on. To solve a congruence is to find the values of the unknown quantity which satisfy the congruence. Thus, to solve the quadratic congruence $x^2 \equiv 39 \pmod{49}$ is to find the number whose square gives a remainder 39 when divided by 49. These numbers are 23, 26.

Bibliography. As to geometry, consult: Henrici, *Geometry of Congruent Figures* (London, 1888); Plücker, *Neue Geometrie des Raumes gegründet auf die Betrachtung der geraden Linie als Raumelement*, ed. by Clebsch (Leipzig, 1868); and as to algebra, Salmon, *Modern Higher Algebra* (Dublin, 1876); Pund, *Algebra mit Einschluss der elementaren Zahlentheorie* (Leipzig, 1899); Pascal, *Repertorium der höheren Mathematik* (Ger. ed., ib., 1902), with bibliography; Weber and Wellstern, *Encyklopädie der elementaren Algebra und Analysis* (ib., 1903) and *Encyklopadie der elementaren Geometrie* (2d ed., ib., 1907), also with bibliography.

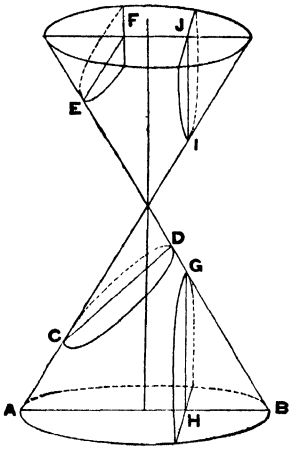
CONI, kō'nē. See Cuneo.

CONIBO, kō-nē'bō. An important tribe of Panoan stock (q.v.), ranging along the middle Ucayali River, northeastern Peru. For a long time they repelled the missionaries, but are now completely Christianized. In their daily life, however, they cling to their old customs, although they learn Spanish readily and are good house servants. They live chiefly by boating, fishing, and gathering sarsaparilla. They paint their faces in red and blue and wear silver rings in their lips and noses. Consult Galt, in *Report of the Smithsonian Institution* for 1877.

CONICEIN. See Coniine.

CON'IC SECTIONS. Curves which may be formed by various sections of a cone (q.v.). In the figure, which represents the two nappes of a right circular cone, *AB*, a section perpendicular to the axis, is a circle; *CD*, a section oblique to

the axis, cutting all the elements of the conical surface on one side of the vertex, is an ellipse; *EF*, a section parallel to the element *CI*, is a parabola; and *GH*, *IJ*, a section cutting both nappes, gives the two branches of an hyperbola. These curves were discovered by Menæchmus in the fourth century B.C. and were known for a long time as Menæchmian triads. The Greeks extensively cultivated the theory of the conic sections. Archimedes contributed to the knowledge of the subject by determining the area of the parabola and by other discoveries. The great work of Apollonius (q.v.) was the classic Greek treatise on the subject. He studied conic sections by the aid of pure geometry, in somewhat the same manner that Euclid (q.v.) treated the elements of the science. Since the invention of coördinate geometry (see ANALYTIC GEOMETRY), new interest has attached to these curves, and the properties of conics form the basis of instruction in analytic geometry. Indeed, the subject is not often treated by pure geometry at present, the analytic method being much simpler. See CIRCLE; ELLIPSE; PARABOLA; HYPERBOLA; CURVE; MATHEMATICS.



CONIDIA (Neo-Lat. nom. pl., from Gk. *κόνις*, *konis*, dust). Aërial spores of fungi, formed in chains or clusters upon a special branch of the mycelium (*conidiophore*). They are formed by the rounding off of a cell or a succession of cells at the tip of a branch, as distinct from the formation of spores within a spore case (*sporangium*). Conidia behave sometimes as spores (producing new plants directly) and sometimes as sporangia (producing and discharging spores). See FUNGI.

CONIDIOPHORE (Neo-Lat. *conidium* + Gk. *-φόρος*, *-phoros*, from *φέρειν*, *pherein*, to bear). The special branch of the body of a fungus (*mycelium*) which bears conidia (q.v.). See FUNGI.

CONIFERÆ (Lat. nom. pl. of *conifer*, cone bearing, from *conus*, cone, Gk. *κῶνος*, *kōnos* + *ferre*, to bear). The greatest of the four living groups of gymnosperms. The species are all trees or shrubs and are characteristic of the temperate regions, being almost entirely absent from the tropics except at high altitudes. Prominent representatives of the group are the pines, spruces, hemlocks, firs, larches, cedars, cypresses, redwoods, junipers, arbor vitæ, and yews. The habit of the trees is characteristic, a central shaft extending continuously to the very top, while the lateral branches spread horizontally, usually reduced in length towards the top of the tree, resulting in a conical outline. Another peculiar feature is the "needle leaf," which seems to be poorly adapted for foliage. It is very slender and firm, being well organized to endure cold. In some of the conifers, however, as in species of *Podocarpus*, the leaves are quite broad and flat; while in others, as in the arbor vitæ, they consist of closely appressed and overlapping disklike bodies. As the leaves have no regular period of falling, the trees are always clothed with them and are commonly called evergreens. There are a few exceptions to this evergreen habit, however, as in the case of the common larch or tamarack, which sheds its leaves every season. The branches of conifers are apt to occur in two forms, as may be seen in the pines. There are the elongated axes, which bear only scales, known as the long shoots; and also short, spurlike, dwarf branches, which bear the clusters of needle leaves. This disposition of the foliage leaves is by no means common to all conifers or even to all ages of the pines. In many conifers, as in spruces and in seedling pines, the needles occur on the long shoots. The structure which gives name to the group is the conelike strobilus which bears the seeds and which sometimes becomes very large. This, when mature, consists of heavy overlapping scales, at the base of which, upon the upper side, the seeds are found. The strobili which are made up of the stamens are never so prominent or permanent and hence are not usually noticed. The pollination of conifers is effected by the wind, and hence the pollen is very light and powdery and is produced in enormous quantities. In the pines the pollen grains are assisted in this wind transportation by the development of a pair of wings, which are outgrowths from the outer coat of the spore. Sometimes strong winds carry the pollen far from the forests which produce it, and the fall of this yellow powder in places in which the phenomenon is rare gives rise to accounts of "showers of sulphur."

Structure. The tissues of the stems of conifers are very characteristic. The woody bundles are arranged to form a hollow cylinder, as in the dicotyledons, and hence are able to increase in diameter during each growing season. It is only the primitive bundles, however, which are made up of true vessels. All of the secondary bundles, which form the whole mass of wood, consist of tracheids, i.e., thick-walled cells resembling true vessels, but not fitted together end to end so as to form more or less continuous vessels. These tracheids are also distinguished, as in all gymnosperms, by bearing upon their walls bordered pits, i.e., thin spots which appear to be bounded by two concentric circles. They are also packed together very closely and with remarkable regularity, so that the wood is very uniform and fine-grained, and hence easily split.

Classification. There are two great families of conifers, the Pinaceæ and the Taxaceæ. The former has true cones, by whose scales the ovules are concealed, and whose seeds ripen dry. In general, the cones ripen dry and hard, but sometimes, as in junipers, they become pulpy, the whole cone forming the so-called "berry." This family (Pinaceæ) is much the larger one and contains four well-marked tribes. Chief among these are the Abietineæ, containing the pines, spruces, hemlocks, firs, larches, etc., the genus *Pinus* with its 70 species being by far the largest genus of conifers. The Cupressineæ contain the various cypresses and cedars; the Taxodineæ contain the bald cypresses, redwoods, and their allies; while the Araucarineæ include the Araucarian or Norfolk pines

of the Southern Hemisphere. The other family, the Taxaceæ, has exposed ovules, and the seed either ripens fleshy or has a fleshy investment. It includes two tribes—the Podocarpineæ, genera of the Southern Hemisphere (the genus *Podocarpus*, with 40 species, being the second largest of the conifers), and the Taxineæ, including the yews (*Taxus*) and their allies.

Some of the conifers, as the pines and junipers, are very widely distributed, while others, like the gigantic redwoods (*Sequoia*) of California and the bald cypress (*Taxodium*) are now very much restricted. The greatest displays of much restricted ("endemic") genera occur in the China-Japan region and in the Australasian region.

Fossil Forms. Conifers are certainly very ancient, for undoubted fossil remains occur from the Permian on, and the total amount of fossil material is enormous. This material was named first upon the basis of external appearance, and the literature of paleobotany is full of names suggestive of affinities with living genera. It has been found that superficial resemblances are misleading, and that even leaf-bearing twigs and cones cannot be relied upon to determine affinities. For example, a number of Cretaceous conifers were referred with confidence to the genus *Sequoia* which have now been discovered to be Araucarians. In recent years the development of our knowledge of vascular anatomy has given a means of determining conifers such as was never possessed before. As a consequence, the enormous amount of Mesozoic material is beginning to be understood. In outlining the fossil history of Conifers, it is necessary to consider the six tribes separately, for they are the real units of conifer classification.

In 1901 competent opinion decided that there was no sure evidence of the Abietineæ (pines and their allies) below the Cretaceous. Later investigations not only discovered pines in the Jurassic, but also discovered that they were already differentiated into their two main series. More recently undoubted pines were discovered in the Triassic of Sweden, so that at present the Abietineæ can be traced to the lowest Mesozoic in a position to be connected with the Paleozoic gymnosperms. Modifications in character can be traced from the living pines through the Cretaceous pines and the still more ancient *Prepinus* to the Paleozoic Cordaitales. It is evident, therefore, that the Abietineæ are as old as any tribe of conifers can be, and that *Pinus* is its oldest genus.

The Araucarineæ (Araucarians) are rival claimants with the Abietineæ for antiquity, and the question as to the relationship of these two tribes is under discussion. It is now known that there existed an extensive Araucarian flora during the Mesozoic, and that this was in all probability the dominant type of conifers at that time. The Araucarians ranged from Greenland to Patagonia in one hemisphere, and from Spitzbergen to Cape Colony in the other, but apparently became almost extinct at the opening of the Tertiary, and are now restricted to South America and the Australasian region, having disappeared from North America, Europe, Africa, and practically all of Asia. In our own country the Atlantic coastal plain evidently supported during the Mesozoic an abundant Araucarian vegetation, and many of the forms that had been referred to other tribes upon superficial evidence have proved to be Araucarians. An abundant and world-wide Araucarian flora during the Jurassic period would suggest the existence of the tribe in much earlier times, and the evidence is accumulating that the Araucarians existed during the earliest Mesozoic, relating them also in time with the Paleozoic Cordaitales. The general impression that the Araucarians are the oldest of conifers seems to have arisen from the abundance of the peculiar Araucarian type of wood in the Paleozoic. This has since been discovered to belong to the Paleozoic group Cordaitales, so that there is no evidence at present that the Araucarians existed during the Paleozoic. There are three alternatives under consideration as to the relationship that exists between Araucarineæ and Abietineæ: either (1) the Araucarineæ were derived from the Abietineæ near the beginning of the Mesozoic; or (2) the Abietineæ were derived from the Araucarineæ at the same early period; or (3) the two tribes originated independently from the Cordaitales.

There is no doubt that the remaining four tribes are much younger than the two just considered. The Taxodineæ (bald cypress, *Sequoia*, etc.) are not known to have existed before the end of the Cretaceous. Claims have been made for the occurrence of *Sequoia* in the Lower Cretaceous and even in the Jurassic, but much doubt has been thrown upon these determinations by the fact that a number of Mesozoic sequoias have proved to be Araucarians. In this state of uncertainty the only safe conclusion is that the Taxodineæ are not older than the Cretaceous, and that the most certain remains are those of the Tertiary. The same statement may be made for the Cupressineæ (cypress, junipers, etc.), for although cypress-like twigs and cones have been described from the Jurassic, there is no reliable evidence of the tribe earlier than the Upper Cretaceous. There is general agreement that these two tribes were derived from the Abietineæ during the course of the Mesozoic.

The two remaining tribes are the Taxineæ (yews, etc.) and the Podocarpineæ (podocarps). Neither of these tribes has been recognized farther back than the Cretaceous, and, so far as this negative evidence can be relied upon, they are comparatively modern tribes among the gymnosperms, certainly much younger than the Abietineæ and Araucarineæ. It is entirely possible that older representatives of these tribes existed, and that they have not been recognized among coniferous remains. The present geographic distribution of the two tribes is sharply contrasted, the podocarps belonging almost exclusively to the Southern Hemisphere and the taxads as exclusively to the Northern. This associates the podocarps with the Araucarians, and the taxads with the other tribes of conifers. It is altogether probable that this association also indicates the phylogenetic connections.

Bibliography. Solms-Laubach, *Fossil Botany* (Oxford, 1891); Scott, *Studies in Fossil Botany* (London, 1909); Coulter and Chamberlain, *Morphology of Gymnosperms* (Chicago, 1910).

CONIINE, kō′nĭ-ĭn (from Lat. *conium*, Gk. *κώνειον*, *kōneion*, hemlock), $C_8H_{17}N$. The active alkaloid principle of hemlock, the seeds of the spotted hemlock plant (*Conium maculatum*, Linné). Being a volatile substance, coniine may be readily obtained from the seeds by distilling with water which contains a little soda in solution; coniine then passes over with the water in the form of a yellowish oil, but, when purified by

redistillation, it is obtained as a colorless, transparent, oily liquid having a penetrating hemlock-like odor, communicating a burning sensation if applied to the tongue and acting as a very energetic poison. It has a powerful alkaline reaction and precipitates metallic oxides from many salts. Strong sulphuric acid causes its compounds to assume first a purple-red and then an olive-green color, while nitric acid gives a blood-red color that fades into an orange. It is moderately soluble in water, its solutions having the property of turning the plane of polarized light to the right. It is sparingly soluble in carbon disulphide, but mixes in all proportions with alcohol. If pure, it boils at 167° C. The coniine sold commercially contains small amounts of j-conicein, an alkaloid closely allied to coniine and having the formula $C_8H_{15}N$. Coniine may be freed from conicein with the aid of ordinary dextrotartaric acid.

The chief physiological effect of coniine is a powerful depression of all motor nerves, beginning at their periphery and gradually ascending to the spinal cord. As a result, all motion, voluntary and reflex, is paralyzed, although the muscles are not affected. This leads to enfeeblement of the respiration and finally causes death by asphyxia. The symptoms of coniine poisoning are increasing heaviness in the legs and feebleness in the arms, dimness of vision, dilated pupils, difficulty in swallowing and breathing, and, finally, loss of the voice. As coniine has no action on the brain, consciousness is preserved until the end. The following illustration will give an idea of the rapidity of its action: One drop placed in the eye of a rabbit killed it in nine minutes; three drops employed in the same way killed a cat in a minute and a half; while five drops poured into the throat of a small dog began to act in 30 seconds, and in as many more motion and respiration had ceased. In a case of coniine poisoning emetics and the stomach pump should be employed as early as possible; the patient's feet should be kept warm, a stimulant injected subcutaneously, and artificial respiration employed. Coniine is but rarely used as a therapeutic agent in medicine; it is extremely doubtful whether it has any useful effect at all, except perhaps in spasmodic diseases, like whooping cough, lockjaw, or epilepsy. Chemically coniine has been shown to be the dextrorotary modification of a-propylpiperidine. The artificial preparation of coniine was the first synthesis of an optically active alkaloid. See ALKALOIDS; HEMLOCK.

CO'NINCK. See KONINCK.

CON'INGSBY, or THE NEW GENERATION. A novel by Benjamin Disraeli (1844).

CO'NINGTON, JOHN (1825–69). An English classical scholar, born at Boston, Lincolnshire. He studied at Rugby, under Dr. Arnold, in 1838–43, and at Magdalen College, Oxford, in 1843–46, and in 1846 became a scholar of University College. In 1849 he read law with much unwillingness for six months, at the London Inns of Court, and thereupon returned to the university. He contributed articles to the *Morning Chronicle* of London during 1849–50. In 1854 he was elected to the chair of the Latin language and literature at Oxford, that professorship having just been founded by Corpus Christi College. His tenure of the post, continued until his death, was markedly successful, and his "imposing personality" extended his influence far beyond his large circle of immediate pupils. His interests in connection with Latin studies were comparatively restricted. He cared little for ancient history, antiquities, or for many authors, even such great writers as Lucretius, Cæsar, Livy, and Cicero. But as a minute and careful interpreter of the more strictly literary aspects of Vergil, Horace, and Persius, and as an accurate, fluent, and generally very readable translator of all three, he gained a justly high repute. His translation (1866) of the *Æneid* in the ballad metre of Scott, though questioned by scholars as a representation of the manner of Vergil, is a vital piece of work and has been much read. The renderings (1863) of the *Carmina* of Horace, and in particular of the *Saturæ, Epistolæ,* and *Ars Poetica* of the same author (1869), won the critical esteem of the learned. His most important work is his edition of Vergil, begun in conjunction with Goldwin Smith, and finished by Prof. Henry Nettleship (*P. Vergill Maronis Opera—The Works of Virgil, with a Commentary,* 3 vols., 1858–70; 4th ed., 1881–84). His edition of Persius, with a remarkably idiomatic prose translation, appeared in 1872 (twice revised by H. Nettleship). He was also a Greek scholar of fine attainments and knew by heart the dramas of Æschylus, whose *Agamemnon* and *Choephori* he edited (the former, with a verse translation and notes, 1848; the latter, 1857). Consult *The Miscellaneous Writings of John Conington,* ed. by J. A. Symonds (London, 1872), which contains a memoir by Prof. H. J. S. Smith.

CONINXLOO, kō'nĭŋks-lō'. A family of Flemish painters, of whom the most celebrated was GILLES III VAN CONINXLOO (1544–c.1607). He was born at Antwerp and studied under Pieter Cock, Lenaert Kroes, and Jan Mastaert. He practiced his art in France, but in 1587, on account of religious persecution, emigrated to Frankenthal and passed his later life in Amsterdam. Recent criticism reveals him as one of the most important Dutch landscape painters of the transition from the sixteenth to the seventeenth century. His development can be clearly followed in such pictures as "The Judgment of Midas" (Dresden) for the early period; two landscapes in the Ambrosiana, Milan—"Latona" (Hermitage, St. Petersburg), and a "Landscape with Venus and Adonis," showing his progress at Frankenthal; and a number of forest scenes with hunters or shepherds (Liechtenstein Gallery, Vienna, Stuttgart, Strassburg, Graz), illustrating his last manner. Martin van Cleef is said to have painted many of the figures for his landscapes, most of which were engraved by Nicolaes di Bruyn and Londerseel. Coninxloo exercised a strong influence on Jan Bruegel, Schonbroeck, Savery, and other Flemish and Dutch landscape painters of the transition period.

CO'NIUM. See HEMLOCK.

CON'JUGAL RIGHTS. The rights which a husband or wife possesses to the companionship, society, service, and affection of the other. For any unlawful invasion of these rights by a third party, the injured spouse has a claim against the wrongdoer. One who alienates the affection of a wife from her husband is liable to him in damages; and in many of the United States the same liability is incurred by a woman who alienates a husband's affections from his wife. A spouse who violates conjugal rights may thereby afford the other a valid ground for divorce. Such misconduct, however, does not give to the innocent spouse the right to inflict chastisement, or

to imprison the offender, or to obtain a decree for restoration of the conjugal relation. Both in England and in the United States the courts have declared that they have no jurisdiction to compel cohabitation where one party to the marital relation withdraws from the society of the other without justifiable cause, nor to enforce a restitution of conjugal rights withheld. In England, however, an ancient action, known as a suit for the restitution of conjugal rights, may still be maintained, but its only consequence is to furnish to the successful plaintiff grounds for a judicial decree of separation from the defendant. See COHABITATION; HUSBAND AND WIFE; MARRIAGE; DIVORCE; and authorities there referred to.

CONJUGA'TÆ, or POND SCUMS. See ALGÆ; CHLOROPHYCEÆ.

CON'JUGATE (Lat. *conjugatus*, p.p. of *conjugare*, to join together, from *com-*, together + *jugare*, to yoke, from *jugum*, yoke; connected with Gk. *ζυγόν*, *zygon*, OChurch Slav. *igo*, Lith. *jungus*, Goth. *juk*, Icel. *ok*, AS. *geoc*, Eng. *yoke*, OHG. *joh*, Ger. *Joch*, Skt. *yuga*, yoke). A term signifying "united in pairs" and having various uses in mathematics. Conjugate *roots* are numbers, real or imaginary, such as $a + \sqrt{b}$ and $a - \sqrt{b}$, or $a + bi$, $a - bi$, satisfying a given equation. (See COMPLEX NUMBER.) Conjugate *angles* are any two angles whose sum is 360°, as 10° and 350°, 400° and −40°, 180° and 180°. Conjugate *points* with respect to a conic are points each of which lies on the polar of the other. (See CIRCLE.) A conjugate *hyperbola* is one which has for its transverse and conjugate diameters the conjugate and transverse diameters of a given hyperbola. The equations of an hyperbola and its conjugate hyperbola are related thus: If $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ is the equation of the given hyperbola, then $\frac{x^2}{a^2} - \frac{y^2}{b^2} = -1$ is the equation of its conjugate. Conjugate *lines*, with respect to a conic, are lines each of which passes through the pole of the other. Conjugate *axes* or diameters of a conic are diameters which are conjugate lines with respect to the conic. Conjugate *triangles* with respect to a conic are triangles such that the sides of each are the polars of the vertices of the other and the vertices of each are the poles of the sides of the other. Conjugate *points* in a harmonic range are a pair of points harmonically separating two others. Thus, if A, P, B, Q, are four collinear points such that $AP : PB = AQ : BQ$, P and Q are called harmonic conjugates. Similarly in a harmonic pencil of four rays O $(APBQ)$, OP and OQ are conjugate rays. (See ANHARMONIC RATIO.) Conjugate *elements* of a determinant (q.v.) are those elements which are symmetrically situated with respect to the principal diagonal. Certain forms of quantics are also called conjugate.

CONJUGATE FOCUS. See LIGHT.

CON'JUGA'TION (Lat. *conjugatio*, combination, from *conjugare*, to yoke together), IN PLANTS. A kind of fertilization, in which there is no visible difference between the male and the female cells (*gametes*). It is restricted to certain low forms of algæ and fungi (qq.v.). See FERTILIZATION.

CONJUGATION. A term in grammar applied to a connected view or statement of the changes of form that a verb (q.v.) undergoes in its various relations. (See INFLECTION.) The forms usually included under this term are those that serve to mark: 1. Person, or the distinction between the speaker, the spoken-to, and the spoken-of: as (I) *write*, (thou) *writest*, (he) *writes*. 2. Number; as (John) *writes*, (they) *write*. 3. Tense, or time; as (I) *write*, *wrote*, *have written*, *shall write*. 4. Mood, or the manner in which the action is presented. When the action is simply asserted, it is the indicative mood, as (he) *wrote;* when put as a supposition or condition, it is the conditional or subjunctive mood, as *if he wrote*. The imperative mood expresses a command or request, and is generally used only in the second person, as *write*. The infinitive mood expresses the action without limitation of any kind—*to write;* as it makes no affirmation, it is, strictly speaking, not a verb, but a kind of abstract noun. The two participles —the one expressing the action as in progress (*writing*), the other as completed (*written*)— may be classed with the infinitive, as not affirming anything. The infinitive and the participles are sometimes called verbals. In opposition to the infinitive and the participles, the other parts of the verb are called finite. 5. Voice, or distinction between active and passive (see VERB); as (he) *wrote* (the letter), (the letter) *was written* (by him).

In English, and in most modern European languages, the greater part of these distinctions are indicated by separate words; in Sanskrit, Greek, and Latin they were nearly all indicated by prefixes and suffixes, or other modifications of the word itself. The nature and origin of these modifications are considered under the head INFLECTION. All verbs do not take the same changes, even in the same language. Although the suffixes, e.g., may have originally been the same, yet they underwent, in course of time, different kinds of corruption or obliteration, depending upon the nature of the sounds in the root verb. This leads to the verbs of a language being arranged in different classes or conjugations. In Latin, e.g., grammarians recognize four conjugations, and verbs that cannot be brought into any class are called irregular verbs.

In English there are two distinct types of the inflections of verbs; thus, *I love* becomes in the past tense *I loved*, and in the passive voice *I am loved;* while *he shakes* becomes *he shook* and *he was shaken*. Verbs that, like *love*, take *d* (or *ed*—sometimes *t*) in their past tense and past participle form one class or conjugation, and those resembling *shake* in their changes form another. The former class is by far the more numerous; but the latter includes the most commonly used and oldest verbs in the language. The mode of change seen in *shake*, *shook*, *shaken* is believed to be more ancient than the other, and is therefore sometimes called the "old" conjugation, but more generally the "strong" conjugation, the other being the "new" or "weak." The terminology "regular" and "irregular" is incorrect. The verbs belonging to the old conjugation are all of Saxon origin and are primitive or root verbs; while derivative verbs belong to the other class. Verbs of the weak conjugation are pretty uniform in taking *d* or *ed*, although after certain sounds the *d* is of necessity pronounced as *t* and is sometimes replaced by that letter in writing—*dreamt*. For the vowel change in the strong conjugation, see ABLAUT. For further information on the conjugation of English verbs, consult: Lounsbury, *English Language* (rev. ed., New York, 1894); Emerson, *History of the English Language* (ib., 1894); Skeat, *Prin-*

ciples of English Etymology, vol. i (London, 1887); *Science of Etymology* (Oxford, 1912); Kaluza, *Historische Grammatik der englischen Sprache* (2d ed., 2 vols., Berlin, 1906); Jespersen, *Growth and Structure of the English Language* (Leipzig and New York, 1905); Krapp, *Modern English* (New York, 1909); Kittredge and Farley, *Advanced English Grammar* (Boston, 1913); and for language in general, Strong, Logeman, and Wheeler, *Introduction to the Study of the History of Language* (New York, 1891). See GRAMMAR; INFLECTION.

CONJUNC'TION (Lat. *conjunctio*, from *conjungere*, to join together, from *com-*, together + *jungere*, to join; connected with Lat. *jugum*, yoke). One of the *parts of speech*, or classes into which grammarians divide words. Conjunctions serve the purpose of connecting sentences, parts of sentences, and single words; as "Day ends, *and* night begins. William *and* John learn Latin. Charles *and* James carried the basket between them." In the first sentence *and* connects two separate affirmations into one compound sentence. The same is true in the second —the separate affirmation being, "William learns Latin," and "John learns Latin." In the third sentence *and* connects only the two words "Charles" and "James," as it cannot be affirmed of either of them alone that he "carried the basket." In most cases, however, it can be shown that, logically at least, two affirmations are involved, and that the conjunction really connects the affirmations. Conjunctions may also connect paragraphs. It is not easy to distinguish conjunctions from adverbs. In fact, conjunctions were all originally other parts of speech; and the greater part of them are still really adverbs and owe their conjunctive effect to their signification as adverbs. In *and* and *but*, whatever may have been the original meaning, we now attend only to the conjunctive effect; *or* is a shortened form of the pronominal adjective *other;* and *nor* is *or* with the negative prefixed. In such a sentence as "I believe that you are wrong," *that* is the demonstrative pronoun, equivalent to—I believe *this*, viz., "you are wrong." This is clearly seen in the corresponding words in other languages: Ger. *dass*, Fr. *que*, Lat. *quod* (for the relatives were originally demonstrative pronouns). All the rest might be called adverbial conjunctions, or conjunctive adverbs; as, "He is industrious; *therefore* he is happy"—i.e., "he is happy *for that*." This adverb, or adverbial phrase, expressive of the cause of the happiness, by referring us back for its meaning to the former assertion, has the effect of connecting the two assertions in the mind. Again, "The messenger arrived *while* he was speaking." Here *while* is equivalent to *at the time at which* (he was speaking). As an adverbial phrase, this simply indicates the time of the act of "arriving"; but as it also expresses that the speaking was going on at the same time, it thus conjoins the two assertions.

The most important distinction among conjunctions will be seen in the following pair of sentences:

> The sun went down, *and* the moon rose.
> The moon rose, *as* the sun went down.

The first (compound) sentence contains two simple sentences or assertions, linked together, yet each standing on an independent footing; the two are joined on terms of equality and are therefore said to be *coördinate*, and the conjunction is called a coördinating conjunction. In the second (complex), the last clause, though a grammatical sentence, contains no logical proposition, no assertion made for its own sake, but merely states a fact as a modifying circumstance with regard to the assertion contained in the first clause. The sentence of the second clause is therefore *subordinate* to that of the first, and the conjunction that marks the relation is a subordinating conjunction. Other kinds of conjunctions are *comparative*, which express equality or difference of degree (e.g., *as, than, just as, as if*, etc.); *conditional*, expressing a condition (*if, unless*, etc.); *copulative* (q.v.), *adversative* (*but, though*), which contrast; *illative* (*therefore*), where the second sentence or clause is an inference from the first; *temporal*, where a time relation is expressed; and so forth.

CONJUNCTION. In astronomy, one of the aspects (q.v.) of the planets. Two heavenly bodies are in conjunction when they have the same longitude, i.e., when the same perpendicular to the ecliptic passes through both. If they have at the same time the same latitude, i.e., if they are both equally far north or south of the ecliptic, they appear from the earth to be in the same spot of the heavens and to cover one another. This phenomenon is called an eclipse in the case of the sun and moon, and an occultation in the case of the moon and a star. The sun and moon are in conjunction at the period of new moon. In the case of inferior planets, like Mercury and Venus, which revolve in orbits interior to that of the earth, there is an inferior conjunction when the planet is between the earth and the sun, and a superior when the sun is between the earth and the planet. In general, a heavenly body is in *conjunction* with the sun when it is on the same side of the earth and in a line with the sun; and it is in *opposition* to the sun when it is on the opposite side of the earth, the earth being in a line between it and the sun. Planets are invisible when in conjunction with the sun, except in rare cases when an inferior planet passes over the sun's disk and may be seen as a dark speck on its surface. The foregoing has reference to *geocentric* conjunctions, or such as are seen from the earth. *Heliocentric* conjunctions are analogous planetary arrangements, such as could be seen by a supposed observer on the sun. In observing a conjunction, eclipse, or occultation, from the earth's surface, it is usual to reduce the observation to what it would be if made from the earth's centre. By this means the exact time of conjunction is more accurately fixed, and it becomes unnecessary to specify the station at which the observation was originally made, the time merely requiring a local correction to render it available at any other station where it may be needed. *Grand conjunctions*, in astrology, are those where several stars or planets are found together. Chinese history records one in the reign of the Emperor Tehuenhiu (2514–2436 B.C.), which astronomers calculate to have actually taken place.

CONJUNC'TIVI'TIS (Neo-Lat., from *conjunctiva*, connective membrane, from Lat. *conjunctivus*, connective, from *conjungere*, to join together), OPHTHALMIA, or OPHTHALMITIS. An inflammation of the conjunctiva, or the mucous membrane that covers the external surface of the eyeball, and the internal surface of the eyelids. The disease occurs in several distinct varieties, which are separately described below:

Acute Catarrhal Conjunctivitis. The symp-

toms of this variety are redness of the surface of the eyes (the redness being superficial, of a bright scarlet color, and usually diffused), sensations of uneasiness, stiffness and dryness, with slight pain, especially when the eye is exposed to the light; an increased discharge, not of tears, except at the beginning of the attack, but of mucus, which at first is thin, but soon becomes opaque, yellow, and thick, pus (matter) being seen at the corner of the eye, or between the eyelashes along the edges of the lids, which it glues together during the night. The disease results from exposure to cold, damp, and dust containing bacteria; it may be transmitted by contact with articles used by those having the disease; or may follow or occur during measles, smallpox, scarlet fever, influenza, hay fever, or coryza.

Chronic Catarrhal Conjunctivitis. This is probably the most common disease of the eye and usually occurs in adults, generally involving both eyes. It often lasts a long time, frequently on account of the continuance of the causes which led to its appearance. Among the most important causes are: acute catarrhal conjunctivitis, improper hygienic surroundings, irritation by dust or smoke, insufficient sleep, abuse of alcohol, and eye strain. The conjunctiva is red and smooth, the secretion is but slightly increased.

Follicular Conjunctivitis. This is an obstinate form of chronic catarrhal conjunctivitis and may be recognized by the small follicles or granular swellings which form upon the lower lids. It closely resembles trachoma (see *Granular Conjunctivitis*, below), commonly called "granular lids," and some even maintain that they are identical.

Acute Purulent Conjunctivitis of Adults, or *Gonorrhœal Ophthalmia.* This differs from catarrhal conjunctivitis in the severity of its symptoms and in its exciting causes. It is a violent form of inflammation of the conjunctiva, is accompanied with a thick, purulent discharge on the second or third day, and is very apt to occasion loss of vision. It begins with the same symptoms as catarrhal ophthalmia, but the conjunctiva becomes intensely swollen, red, and elevated from the sclerotic projecting around the cornea. Similar swelling takes place in the mucous membrane lining the eyelids, causing them to project forward in large, livid, convex masses, which often entirely conceal the globe of the eye. These symptoms are accompanied by severe pain, tenderness of the eye, and slight fever. When the disease is unchecked, it is liable to produce ulceration or sloughing of the cornea, with the escape of the aqueous humor and protrusion of the iris; and, even when these results do not follow, vision is often destroyed by permanent opacity of the cornea.

The disease is unquestionably contagious and arises from the application of gonorrhœal discharge or matter to the surface of the eye by means of towels or fingers, and hence is most common in persons suffering from the disease from which this variety obtains its specific name.

Purulent Conjunctivitis of Infants, or *Ophthalmia neonatorum.* This usually appears about the third day after birth. It is apt to be overlooked until it has made considerable progress. The disease gives rise to the same symptoms and, if not checked, progresses in much the same way as in adults. It is, however, more amenable to treatment, and with proper care sight is seldom impaired, provided the disease has not extended to the cornea before medical aid is sought. *Ophthalmia neonatorum* is the result of gonorrhœal infection of the eyes from the mother during birth. It is practically preventable by the use of Credé's method of cleansing the eyes immediately after birth, and putting one drop of a 2 per cent solution of silver nitrate into each eye. This is a routine practice in many of the maternity hospitals and has done much in these institutions and among the better classes to diminish the frequency of the affection.

Diphtheritic Conjunctivitis and **Croupous Conjunctivitis.** These are forms caused by the bacillus of diphtheria.

Phlyctenular Conjunctivitis, called also *Pustular Conjunctivitis*, or *Scrofulous Ophthalmia.* This occurs in children, especially of the lower classes, who suffer from the tuberculous or so-called scrofulous diathesis or constitution. The cornea is generally involved in the process. The most prominent symptom is extreme intolerance of light, the lids being kept spasmodically closed. When they are forcibly separated, a slight vascularity, usually stopping at the edge of the cornea, is observed, and at or about the line of separation between the cornea and sclerotic small opaque pimples or pustules appear. Treatment consists in improving the general health and in appropriate local applications. This form of disease, being dependent on constitutional causes, is often very obstinate and is liable to recur.

Granular Conjunctivitis, *Trachoma*, or "granular lids." This is a contagious affection of the eye, most frequently carried by towels, etc., used in common by many persons, and therefore found chiefly in crowded and dirty houses, in schools, barracks, etc. It occurs very frequently in Arabia, Egypt, and the lowlands of Europe. In this country the negro race is seldom affected. The disease has been called Egyptian ophthalmia on account of its importation into Europe from Egypt during the wars of Napoleon. It is accompanied by itching and burning of the lids, pain, flow of tears, and, in the advanced cases, with poor vision. The lids are swollen, the upper drooping; there is a variable amount of mucopurulent discharge. The conjunctiva of the lids and fornix, or fold between lids and eyeballs, is red, thickened, and covered with many small papillæ, or velvety elevations, or by granules which are round, translucent, and yellow or grayish. After a time scar tissue forms, and the papillæ and granules disappear. The disease may be acute, but usually begins gradually and lasts for years. The dangerous complications are ulceration of the cornea alone or accompanying a condition known as *pannus.* In the latter, new tissue containing blood vessels gradually forms until the cornea is covered partially or wholly. If this disappears later, sight will be restored; otherwise the new tissue causes permanent opacity, an accident which may also result from corneal ulceration. Entropion (q.v.), trichiasis (q.v.), ectropion (q.v.), or symblepharon, a cicatricial adhesion of the conjunctiva of the lid to that of the eyeball, may follow trachoma. Among numerous other varieties of conjunctivitis two forms require mention, viz., simple follicular conjunctivitis, and vernal catarrh, both of which are accompanied by the appearance of granules or follicles and are frequently mistaken for true trachoma.

The treatment may require either local applications or surgical interference. Prevention is most important. Persons having the disease should exercise great care that others may not use their towels or other toilet articles which might serve to convey it, and in public institutions cases should be carefully watched for and isolated.

CONJURY, kŭn'jēr-ĭ (from *conjure,* OF., Fr. *conjurer,* from Lat. *conjurare,* to swear together, from *com-,* together + *jurare,* to swear, from *jus,* law). Incantation, bewitchment, or magic. Specifically, the casting of spells, or evil enchantment, characteristic of Afro-American folklore. See MAGIC.

CONKLIN, EDWIN GRANT (1863–). An American zoölogist, born at Waldo, Ohio, and educated at Ohio Wesleyan and Johns Hopkins universities. He was professor of biology at Ohio Wesleyan (1891–94) and professor of zoölogy at Northwestern (1894–96), the University of Pennsylvania (1896–1908), and Princeton (after 1908). He became coeditor of the *Journal of Morphology,* the *Biological Bulletin,* and the *Journal of Experimental Zoölogy.* He was president of the American Society of Zoölogists in 1899 and president of the American Society of Naturalists in 1912.

CONK'LING, ROSCOE (1829–88). An American politician. He was born at Albany, N. Y., and, after receiving an academic education, at the age of 17 began the study of law in the office of Spencer and Kernan at Utica. His first identification with politics was in 1848, when he won some reputation as a campaign speaker by making a number of speeches in behalf of Taylor and Fillmore. In 1850 he was admitted to the bar, and in the same year became district attorney of Albany County by appointment of Governor Fish. In 1852 he returned to Utica, where in the next few years he established a reputation as a lawyer of ability. Up to 1852, in which year he stumped New York State for Gen. Winfield Scott, the Whig candidate for the presidency, Conkling was identified with the Whig party, but in the movement that resulted in the organization of the Republican party he took an active part, and his work, both as a political manager and an orator, contributed largely towards carrying the State for Frémont and Dayton, the Republican nominees, in 1856. In 1858 he was elected mayor of Utica, and in the same year was chosen a Representative in Congress, serving throughout the period of the Civil War, except in the Thirty-eighth Congress (1863–65), during which interval he acted as a Judge Advocate of the War Department. He was again a member of Congress in 1865–67. In his career in the House of Representatives Conkling won national distinction as a debater and orator. He was an enthusiastic supporter of the Lincoln administration in its conduct of the war, but vigorously opposed the passage of the Legal Tender Act in 1862. He was a member of the Committee of Ways and Means, and the Special Committee of Fifteen on Reconstruction, delivering one of the strongest speeches in support of the Fourteenth Amendment. His renown as an orator and prominence in the legislative councils of the Republican party secured him in 1867, at the age of 38, an election to the United States Senate to succeed Judge Ira Harris. Conkling's career in the Senate was brilliant, but, like all the rest of his political life, erratic and marked by strong personal likes and dislikes, by which, rather than by regard for the welfare of the nation or of his party, he was frequently controlled. Through the eight years of Grant's administration he stood out as the spokesman of the President and one of the principal leaders of the Republican party in the Senate. He was active in framing and pushing through Congress the reconstruction legislation, and was instrumental in the passage of the second Civil Rights Act, in 1875, and of the act for the resumption of specie payments, in the same year. In the Republican National Convention at Cincinnati in 1876, Conkling first appeared as a presidential candidate, receiving 93 votes. He was one of the framers of the bill creating the Electoral Commission to decide the disputed election of 1876, but, when its judgment was announced, declined to vote for its affirmation. Himself an opponent of civil service reform, Conkling was entirely out of sympathy with the reform element in the Republican party. The first break with the administration occurred in April, 1877, when the Secretary of the Treasury, John Sherman, appointed a commission to investigate the affairs of the customhouse. The investigation brought to light extensive irregularities in the service, showing in particular that the Federal officeholders in New York constituted a large army of political workers, and that their positions were secured by and dependent upon their faithful service in behalf of the men holding the principal government offices in the city. President Hayes decided upon the removal of Chester A. Arthur, the collector, Gen. George H. Sharpe, the surveyor, and A. B. Cornell, the naval officer of the port, and in October, 1877, sent nominations of their successors to the Senate. Senator Conkling defended the displaced officials, and, through his influence in the Senate, secured the rejection of the new nominations. He succeeded in blocking all the efforts of President Hayes and Secretary Sherman until January, 1879, when, a new lot of nominations having been made, they were confirmed in spite of Conkling's continued opposition. Early in 1880 Senator Conkling became the leader of the movement for the nomination of General Grant for a third term in the presidency. How much of his advocacy was due to his regard for Grant, and how much to his hostility to the two other leading candidates—Sherman, with whom he had come into conflict during Hayes's administration, and Blaine, whose bitter political and personal enemy he had been for 24 years—can never be known. The convention, by a combination of the Blaine and Sherman interests, nominated James A. Garfield. Conkling and the famous "306" remained faithful to Grant to the last and were allowed to name the candidate for Vice President. The result emphasized Conkling's hostility towards Blaine and eventually led to the former's quarrel with Garfield and consequent retirement from political life. Immediately after Garfield's inauguration, Conkling presented to the President a list of men whom he desired to have appointed to the Federal offices in New York. Garfield's appointment of Blaine as Secretary of State, and of Windom as Secretary of the Treasury, instead of Levi P. Morton, whose appointment Conkling had urged, angered Conkling and made him unwilling to agree to any sort of compromise with Garfield on the New York appointments. Without consulting him, the President nomi-

nated for the collector at New York William H. Robertson, an anti-Conkling man. Robertson's nomination was confirmed by the Senate, in spite of the opposition of Conkling, who claimed the right of Senators to control Federal patronage in their States. Conkling and his colleague, Thomas C. Platt, immediately resigned their seats in the Senate and appealed to the New York Legislature to justify their course by reëlecting them. After an exciting canvass Conkling and Platt were defeated, and Warner Miller and E. G. Lapham were chosen in their stead. The remainder of his life Conkling spent in the practice of law in New York City. In 1882 he was nominated by his friend, President Arthur, to succeed Ward Hunt as an associate justice of the United States Supreme Court, but he declined. Consult *Life and Letters*, edited by A. R. Conkling (New York, 1889).

CONN. An irresponsible, gay-spirited fellow, the leading character in Dion Boucicault's play *The Shaughran.*

CONN, HERBERT WILLIAM (1859–). An American zoölogist and bacteriologist, born at Fitchburg, Mass. He took his baccalaureate degree at the Boston University and his doctorate at Johns Hopkins University, and soon afterward became professor of biology at Wesleyan University in Connecticut. From 1889 to 1897 he was director of the Marine Biological Laboratory at Cold Spring Harbor, L. I. He is considered an authority on the bacteriology of dairy products, in connection with which he published many papers (1890–1905) under the auspices of the Agricultural Station at Storrs, Conn. In 1905 he became bacteriologist of the Connecticut State Board of Health and director of the State laboratory. His works include: *Evolution of To-Day* (1886); *The Living World* (1891); *The Study of Germ-Life* (1897); *Classification of Dairy Bacteria* (1899); *The Method of Evolution* (1900).

CONNAUGHT, kŏn'nȧt (Ir. *Connacht*). The northwestern and smallest of the four provinces of Ireland, bounded north and west by the Atlantic Ocean, east by Ulster and Leinster, and south by Munster (Map: Ireland, B 3). It contains the counties of Galway, Leitrim, Mayo, Roscommon, and Sligo. Area, 6571 square miles. Pop., 1841, 1,420,900; 1891, 719,500; 1901, 646,932; 1911, 595,040.

CONNAUGHT, ARTHUR WILLIAM PATRICK ALBERT, DUKE OF, Prince of the United Kingdom (1850–). The third son of Queen Victoria. He entered the Military Academy at Woolwich in 1866 and in 1880 became a major general. He was created Duke of Connaught and Strathearn and Earl of Sussex in 1874 and took his seat in the House of Lords. In 1879 he married Princess Louise Marguerite of Prussia. He served in Egypt in 1882, became a general in 1893, and from 1893 to 1898 was in charge of the permanent camp at Aldershot. In 1896 he represented Queen Victoria at the coronation of the Czar Nicholas II and in 1903 was the representative of Edward VII at the coronation durbar at Delhi. He succeeded Lord Roberts as commander in chief of the forces in Ireland in 1900, became field marshal in 1902 and inspector general of the forces in 1904, and was commander in chief in the Mediterranean in 1907–09. In October, 1911, he arrived in Quebec as Governor General of Canada. In 1914 Prince Alexander of Teck, Queen Mary's brother, was appointed as his successor. The Duke's children include the Crown Princess of Sweden (born 1882), Prince Arthur (born 1883), who married the Duchess of Fife in 1913, and Princess Victoria Patricia (born 1886), popularly known as "Princess Pat."

CONNEAUT, kŏn'nē-ȧt'. A city on Conneaut Creek, Ashtabula Co., Ohio, 68 miles by rail northeast of Cleveland, noted as the landing place of the first white settlers of northern Ohio in 1796 (Map: Ohio, J 2). It is on the Lake Shore and Michigan Southern, the New York, Chicago, and St. Louis, and the Bessemer and Lake Erie railroads, and has a good harbor at the mouth of the creek, where there is a lighthouse. It is an important ore and coal port, being noted for its exceptional facilities for handling large cargoes. There are extensive railroad shops and manufactories of canned goods, self-sealing packages, bricks, shovels, leather, lumber, etc. Conneaut also exports molding sand and farm produce. The city contains three hospitals, a Carnegie library, and a public park. The electric-light plant is owned and operated by the city, which was first incorporated in 1832. It is governed by a mayor, elected biennially, assisted by a council. Pop., 1890, 3241; 1900, 7133; 1910, 8319.

CONNECTICUT, kŏn-nĕt'ĭ-kŭt (Algonquin *Quinni-tuk-ut*, long river). One of the original thirteen States of the United States; a north Atlantic coast State and the southwesternmost of the New England States (Map: United States, L 2). It is included between lat. 40° 59′ and 42° 3′ N. and long. 71° 47′ and 73° 43′ W., and is bounded on the north by Massachusetts, on the east by Rhode Island, on the south by Long Island Sound, and on the west by New York. It has an extreme length from east to west of nearly 105 miles, and an average length of about 95 miles; an extreme width from north to south of 76 miles, and an average width of 57 miles, with a total area of 4965 square miles, of which 145 square miles are water surface. Connecticut is one of the smallest States in the Union, only two States being smaller, but it ranks thirty-second in population. The boundary lines between Connecticut and the adjoining States are somewhat irregular, since they depend on old grants and surveys which were very unsystematic.

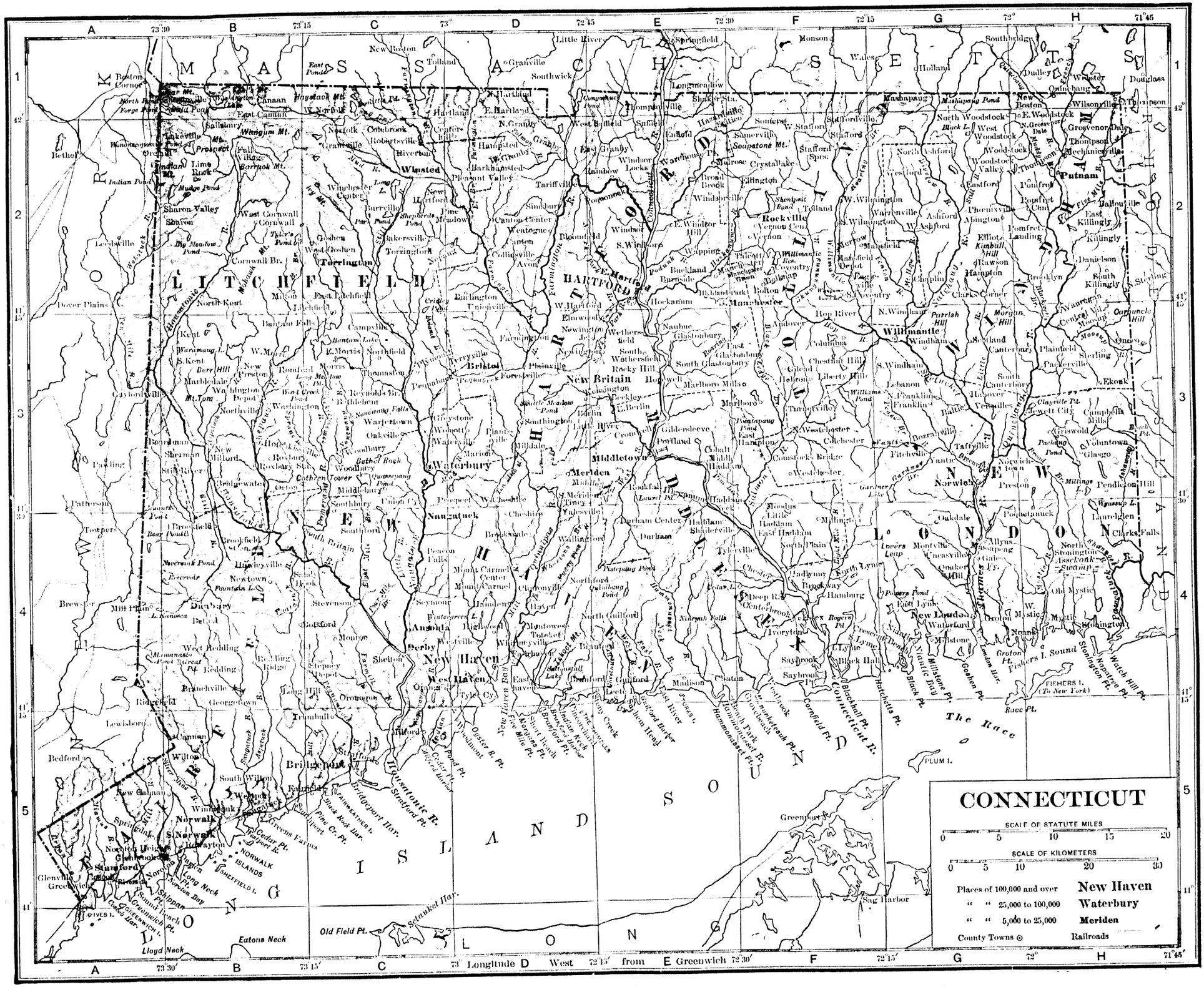
Topography. The area of Connecticut may be divided into three parts, a western highland and an eastern highland and between them a central lowland. The central lowland is everywhere less than 500 feet in altitude, with the exception of a longitudinal hill range, which in its southern part is broken into detached portions arranged in echelon, and two or three shorter hill ranges near the western border. From the northern boundary of the State, as far as Middletown, that central lowland is traversed by the Connecticut River. From Middletown to Long Island Sound the Connecticut River traverses a corner of the eastern highland in a narrow gorge. The Connecticut River is a tidal estuary from its mouth to a point beyond Hartford; and, at the northern boundary of the State, the flood plain of the Connecticut has an altitude less than 60 feet. With the exception of the hill ranges above referred to, the whole central lowland is an area of very slight relief. In strong contrast with the central lowland the western and eastern highlands are exceedingly rugged, showing substantially no level tracts ex-

cept the narrow flood plains and terraces of the rivers. The highest altitudes of the State are near the northwest corner, Bear Mountain attaining an altitude of 2355 feet, and Gridley Mountain an altitude of 2200 feet. Both of these are in the town of Salisbury. The culminating points of the eastern highland are only about half as high as those of the western highland. Bald Hill in Union is 1285 feet in altitude, and Snow Hill in Ashford 1213 feet. The rivers flow through these rugged highlands in narrow valleys. Both the eastern and western highlands rise pretty abruptly from the surface of the central lowland, so that from points in the lowland the view either eastward or westward is bounded by what appears to be a mountain wall. In spite of the absence of level country in the highlands, it is noteworthy that from almost any point of view the sky line appears straight and almost horizontal. Most of the culminating points of the highlands, and also the summits of the hill ranges within the central lowland, may be conceived to touch an imaginary inclined plain sloping gently southeastward from the northwest corner of the State. The topography accordingly suggests that the eastern and western highlands are both remnants of an uplifted and tilted peneplain, in which have been carved by erosion the broad central lowland and the narrow highland valleys. The topographic difference between the highlands and the lowland results from the geological structure, the highland rocks being strong and the lowland rocks weak. The eastern and western highlands are simply the south end of the general highland of central and western New England. While the whole area of Connecticut appears at one time to have been eroded nearly to a base-level plain, the surface of the region farther north seems never to have been so completely peneplained, some isolated summits, like Wachusett and Monadnock and the great mountain mass of the White Mountains, having never been degraded to the general level. Between the highlands of New Hampshire and Vermont the Connecticut River flows in a narrow valley, the soft rocks which have permitted the erosion of the broad central lowland of Connecticut not extending so far north as the northern boundary of Massachusetts.

The coast of Connecticut is very broken and irregular and consists of a succession of rocky points and gravel or sandy beaches. It possesses a number of good harbors, and the larger rivers have estuary-like mouths. The coast waters are shallow, but usually deep enough to permit vessels to come close to land. Numerous small rocky islands skirt the shores; the largest island on this coast being Fisher's Island, off the mouth of the Thames, which, while geographically belonging to the Connecticut coast, politically belongs to New York.

The hydrography of Connecticut is simple in general outline, the streams for the most part following the slope of land from the north towards the south. Since this slope is but a continuation of the higher land to the north, the main streams rise north of the Connecticut boundary, and the waters flow in a generally southerly direction across the State and empty into Long Island Sound. There are three main river systems—the Housatonic-Naugatuck in the west, the Connecticut in the middle, and the Thames in the east. The streams tributary to these main rivers are numerous, and some of them are of considerable size. In the southern part of the State there are many small streams which have a southerly direction and flow straight to the Sound. Few of these small streams are more than 25 miles in length in a direct course. The Connecticut watercourses have in general deeply cut their paths through the highlands, so that on the main streams the fall is less than might be expected from the neighboring elevations. The smaller streams, however, and the larger ones in their upper courses, furnish a large supply of water power.

Geology. The rocks of the highlands are highly crystalline. Gneisses and mica schists are the most abundant, though in the western part of the State there are some bands of crystalline limestone or marble, and in various parts of the State are found some crystalline rocks of more basic constitution than the prevalent gneisses and schists. The gneisses often grade into granite and are often cut by intrusive masses of granite. These crystalline rocks are all pre-Triassic in age, but how much is pre-Cambrian and how much is Paleozoic is not known. So complete has been the metamorphism that no vestiges of fossils have yet been found in any part of the crystalline areas of Connecticut. Some of the formations of the western part of the State have been traced into the adjacent States of Massachusetts and New York, and their stratigraphic position has been fairly well established. The marbles of the western border are of Cambrian and Ordovician age. Certain others of the rocks of the western highland have been definitely recognized as respectively pre-Cambrian, Cambrian, and Ordovician. In regard to most of the rocks of the western highland, and all, or nearly all, the rocks of the eastern highland, nothing more definite can be said than that they are pre-Triassic. The area of Connecticut was doubtless affected by the orogenic movements of pre-Cambrian, post-Ordovician, and post-Carboniferous times, and how much of the disturbance and metamorphism which the rocks have suffered is due to each of these revolutions cannot now be determined. The last of these orogenic movements left mountain areas of considerable elevation in eastern and western Connecticut; between which lay a broad geosynclinal depression, where now is the central lowland of the State. In this trough were deposited the Triassic rocks which are now the surface rocks of that area. These rocks are chiefly red sandstones, varying into shales and conglomerates. None of the deposits are marine. How much respectively is estuarine, fluvial, lacustrine, pluvial, and æolian, is not definitely known. About the middle of the period of Triassic deposition was an epoch of vulcanism. Intrusive sheets of igneous rock came to be intercalated among the lower strata, while three great lava sheets at comparatively short intervals found their way to the surface, each in its turn to be covered by later sediments. The second of these lava sheets was a massive one, several hundred feet in thickness. At the close of the Triassic a broad geanticlinal uplift, whose axis was near the western border of Connecticut, uplifted and tilted the sandstones, giving them a general dip to the east. This elevation was accompanied with considerable faulting of the strata. During the later Mesozoic the area of Connecticut suffered a great amount of erosion, and, by the close of Mesozoic time, the crystalline and the Triassic areas alike were reduced to a peneplain. In early Tertiary time this


CONNECTICUT
SCALE OF STATUTE MILES
0 5 10 15 20
SCALE OF KILOMETERS
0 5 10 20 30
Places of 100,000 and over New Haven
" " 25,000 to 100,000 Waterbury
" " 5,000 to 25,000 Meriden
County Towns ⊙ Railroads
Longitude West from Greenwich
MASSACHUSETTS
RHODE ISLAND
NEW YORK
LONG ISLAND SOUND
LITCHFIELD
HARTFORD
TOLLAND
WINDHAM
NEW LONDON
MIDDLESEX
NEW HAVEN
FAIRFIELD
Waterbury
New Britain
Middletown
Meriden
New Haven
Norwalk
Stamford
Bridgeport
Norwich
New London
Willimantic
Manchester
Hartford
Torrington
Danbury
Putnam
Thames R.
Connecticut R.
Housatonic R.
Naugatuck R.
Quinnipiac R.
Farmington R.
Shetucket R.
Pawcatuck R.
Five Mile R.
Saugatuck R.
Mianus R.
Byram R.
Blue Hills
Talcott Mt.
Lantern Hill
Mt. Tom
Prospect Mt.
Wangum Mt.
Barrack Mt.
Bear Mt.
Indian Mt.
Lime Rock
Pine Mt.
Mt. Riga
Haystack Mt.
Bald Mt.
Mt. Frissell
Mt. Everett
Bear Mountain
Mt. Washington
Mt. Riga
Mt. Tom
Talcott Mt.
Lantern Hill
Blue Hills
Pine Mt.
Lime Rock
Indian Mt.
Barrack Mt.
Wangum Mt.
Prospect Mt.
Haystack Mt.
Bald Mt.
Mt. Frissell
Mt. Everett
Bear Mountain
Mt. Washington
Long Island Sound
Eatons Neck
Lloyd Neck
Old Field Pt.
Sag Harbor
Greenport
Plum I.
The Race
Fishers I.
Gardiners Bay
Block I.
Watch Hill Pt.
Stonington
Mystic
Groton
New London
Norwich
Willimantic
Putnam
Danielson
Killingly
Thompson
Woodstock
Pomfret
Brooklyn
Canterbury
Plainfield
Sterling
Voluntown
Griswold
Lisbon
Preston
Ledyard
Montville
Salem
Colchester
Lebanon
Columbia
Coventry
Mansfield
Tolland
Vernon
Rockville
Ellington
Somers
Stafford
Enfield
Suffield
Windsor Locks
East Windsor
Windsor
Bloomfield
Avon
Canton
Simsbury
Granby
Barkhamsted
New Hartford
Winchester
Torrington
Goshen
Cornwall
Kent
Sharon
Salisbury
Canaan
Norfolk
Colebrook
Hartland
East Hartland
North Granby
West Granby
East Granby
Windsor
Bloomfield
Avon
Canton
Simsbury
Granby
Barkhamsted
New Hartford
Winchester
Torrington
Goshen
Cornwall
Kent
Sharon
Salisbury
Canaan
Norfolk
Colebrook
Hartland
East Hartland
North Granby
West Granby
East Granby
Windsor Locks
East Windsor

peneplain was uplifted so as to attain in the northwestern corner of the State an altitude of about half a mile, from which it sloped gently towards the southeast. The present topography was carved in Tertiary time out of this tilted peneplain. The broad central lowland was excavated in the weak Triassic rocks. The outcrops of the lava sheets and of the intrusive sheets of igneous rock determined the location of the hill ranges of the central lowland. The faulting of the strata broke the continuity of those outcrops and gave the resultant ridges their echelon arrangement. In the regions of the hard crystalline rocks the streams have been able to excavate only narrow valleys, and the culminating points of the dissected plateau retain approximately the altitude of the tilted peneplain.

Connecticut was covered by the ice of the Glacial period. While the rocks everywhere bear the characteristic marks of glacial scouring, it is not believed that the general topography of the State was in any considerable degree altered by glacial erosion. The effects of glacial deposition, covering the whole area of the State with an irregular mantle of drift, are seen in innumerable lakes and ponds. Disturbances of drainage by glacial deposition have resulted in the formation of numerous waterfalls. A very remarkable example of change of drainage due to the events of the Glacial period is shown by the streams in the western part of the central lowland. Prior to the Glacial period a single river flowed southward from near the northern boundary of the State to New Haven Bay. The course of that river is now represented by parts of the Farmington, Pequabuck, Quinnipiac, and Mill. The inlets and harbors of the Connecticut coast are due to a slight post-Glacial depression which drowned the south ends of the valleys.

Climate and Soil. In Connecticut the average annual temperature decreases from about 50° F. on the south coast to about 48° in the northeast and 46° in the northwest. In midwinter the average temperatures decrease from about 30° along the south coast to 24° in the north. In all portions of the State the temperature usually descends below zero at times during the winter and may even fall as low as —10° or —15° F. In midsummer the average temperature is about 72° along the south coast, but increases to 74° in the middle interior, and decreases again to about 70° in the northwest. During the summer extreme temperatures ranging from 90° to 100° F. may be expected in all parts of the State.

The prevailing winds in Connecticut are from the westward. In the winter the prevailing wind throughout most of the State is from the northwest, and in midsummer from the southwest. The prevalent southwest winds during the summer months considerably lower the land temperatures on the south coast and to some distance inland, while the prevalent northwest winds during the winter carry the inland cold air to the coast. The monthly mean value of relative humidity varies from about 60 to about 80 per cent, and is generally a little less in the spring than at other times of the year, though the variation is very irregular. Throughout most of the State the average rainfall during the year is from 45 to 50 inches. The precipitation is extremely irregular, but on the average not very unequally distributed among the months of the year. The snowfall varies very much from year to year, but on an average for a series of years about 40 inches fall on the south coast, and there is a rather regular increase towards the northern part of the State to 50 inches in the northeast corner and to 60 inches in the northwest corner.

The valley land of Connecticut is usually a rich alluvial deposit. The higher ground is mostly covered with glacial till, affording a stony soil, much of which is well adapted for forestry, fruit growing, and pasturage. The northern part of the Connecticut River valley, as far south as Middletown, has a rich, deep, loamy soil, often with a clay subsoil. In the southern part of the State the soil is sandy, as also along the coast, which extends for about 100 miles and is broken by numerous small bays.

Mining. Connecticut has small importance as a producer of minerals, the total value of the mineral products being less than $4,000,000 annually, and of this approximately 80 per cent is derived from quarries and clay products. An inconsiderable quantity of iron ore is mined, and a small quantity of pig iron is made, but aside from that there is in the State no metal mining nor any production of mineral fuel. The quarrying industry in 1912 yielded products valued at $1,467,458, compared with $1,215,462 in 1911. The principal stone quarried is designated in the trade as granite, although much of the material quarried under the name of granite is gneiss. Quarrying of trap rock is also an important industry, and the value of the output of this in 1912 was about 75 per cent of that of granite or gneiss. Granite is quarried in every county, but the principal operations are in New Haven and New London counties, and there are others of considerable importance in Windham and Fairfield counties. Trap rock is produced chiefly in Hartford and New Haven counties. In addition to granite and trap rock, commercial quarries of red sandstone are operated at Hartford, Middlesex, and New Haven counties, and some marble has been produced in Litchfield County. Clay-working establishments are located chiefly in the Connecticut River valley. The product consists chiefly of common brick, which represents nearly 90 per cent of the total output of clay. Clay products were valued in 1912 at $1,507,787, compared with $1,284,106 in 1911. Lime, valued at $371,356, was produced in 1912, compared with the value of $328,904 for the product of 1911. The lime-producing counties are Fairfield and Litchfield in the extreme western part of the State. Connecticut is the third State in the Union in the production of feldspar. The output in 1912 amounted to 19,075 short tons, valued at $94,097, compared with 16,497 short tons, valued at $73,557 in 1911. Other commercial mineral products are infusorial earth, mineral waters, quartz, sand-lime brick, sand, and gravel. The total value of the mineral products of the State in 1912 was $3,716,480, compared with $3,151,588 in 1911.

Agriculture. Practically all the soils of the State are derived, either directly or indirectly, through the glaciation of the numerous varieties of underlying rock. The highland portions have been chiefly swept bare of the finer soil-forming material at all of the higher altitudes and upon the more precipitous slopes. The lower slopes and the more gently rolling portions of the highlands are deeply covered with complex glacial débris known as "till." This gives rise

chiefly to stony, sandy loams and stony loams, with smaller areas of heavier loam. Within the Connecticut River basin and in all the smaller valleys found within both portions of the highland, there were deposited gravels, sands, sandy loam, and clays at the time of the recession of the glacial ice. These more level portions constitute some of the best agricultural lands within the borders of the State. Upon the sandy loams and the loamy soils the tobacco industry, the market gardening, and a considerable part of the fruit industry are carried on. The upland soils are chiefly used for grazing and the production of grass and corn. Extensive areas are too steep in slope or too rocky for any other occupation than that of forestry or pasturage. The growing horticultural interests of the State are located chiefly upon the deeper areas of the glacial loams in the highland portions. That agriculture has not progressed in recent years is shown by the figures of the thirteenth census taken in 1910, compared with those of the census of 1900. In 1910 the total number of farms in the State was 26,815, while in 1900 it was 26,948—a decrease of 133 in the decade. Of the total land area of approximately 3,084,800 acres, there were in 1910 in farms 2,185,788 acres, while in 1900 there were 2,312,083—a decrease of 126,295 acres in the decade. The improved land in farms in 1910 was 988,252, while in 1900 it was 1,064,525 acres—a decrease of 76,273 acres. The average acres per farm in 1910 were 81.5, compared with 85.8 in 1900. The total value of farm property in 1910 was $159,399,771, compared with the value in 1900 of $113,305,580. This valuation includes land, buildings, implements and machinery, domestic animals, poultry, and bees. The average value of all property per farm in 1910 was $5944, and in 1900, $4205. In 1910 the average value of land per acre was $33.03, and in 1900, $22.68. Of the total number of farms in the State, in 1910, 24,183 were operated by owners and managers, and 2632 by tenants. In 1880 about 10 out of every 100 farms in the State were operated by tenants. This proportion increased during the next 20 years, until in 1900 about 13 farms in every 100 were operated by tenants. In the succeeding decade the movement was reversed, and the tenancy in 1910 was a little less frequent than in 1880. Of the farms owned in 1910, 13,080 were free from mortgage and 9958 were mortgaged. The average debt per farm in 1910 was $1309, and the average equity per farm was $2874. The largest number of Connecticut farms are from 50 to 99 acres. Changes during the last decade have been in the direction of increases in the relative number of smaller farms at the expense of the relative number of larger ones. In 1910 three out of every four Connecticut farmers were native whites, and one out of every four was a foreign-born white. The native white farmers numbered 19,841, and the foreign-born 6861. The negro and other non-white farmers numbered 113. Of the foreign-born white farmers, 1538 were Germans, 1164 Irish, 676 Russians, 675 Swedish, 551 English, 544 Austrian, 396 Canadian, 319 Italian, 191 Hungarian.

The general character of the agriculture of the State is indicated by the fact that only about nine per cent of the total value of crops is contributed by the cereals, while nearly one-third is contributed by hay and forage, nearly one-sixth by tobacco, and about one-sixth by potatoes and other vegetables, the remainder, representing in value about 22 per cent of the total, consists mostly of forest products, fruits and nuts, flowers and plants, and nursery products. The acreage, production, and value of the principal crops in 1909 and in 1913 are shown in the table below. The figures for 1909 are from the thirteenth census, while those for 1913 are estimates made by the United States Department of Agriculture.

PRODUCTS		Acreage	Product bu.	Value
Corn	1913	61,000	2,348,000	$1,966,000
	1909	52,717	2,530,542	1,693,939
Oats	1913	11,000	308,000	169,000
	1909	10,207	273,804	161,188
Rye	1913	7,000	135,000	124,000
	1909	7,601	137,692	123,848
Potatoes	1913	24,000	2,208,000	1,921,000
	1909	23,959	2,684,414	1,882,197
Hay	1913	379,000	432,000*	8,683,000
	1909	401,322	549,366	7,224,500
Tobacco	1913	18,400	28,520,000†	5,989,000
	1909	16,042	28,110,453	4,415,948

* Tons † Pounds.

As will be noted from this table, by far the most important product of the State is hay and forage, and the second in value is tobacco. Potatoes, with an acreage of about 50 per cent above that of tobacco, show a value hardly one-third as great. The acreage of corn decreased very greatly from 1879 to 1889, but since the latter date it has shown considerable increase. Oats decreased in acreage from 1870 over 72 per cent, although there was a slight increase from 1899 to 1909. During the last decade the increases in acreage are in tobacco, corn, and oats; decreases in acreage are in rye, buckwheat, hay and forage, and potatoes. The cultivation of tobacco was begun in 1640, if not earlier, and it is confined chiefly to the valleys of the Housatonic and Connecticut rivers. The tobacco, which is of a superior quality and of a mild flavor, is used chiefly for wrappers for cigars made from the stronger-flavored Havana tobacco.

The growing of vegetables is one of the most important agricultural industries. The value of the vegetables other than potatoes and sweet potatoes in 1909 was $1,965,635, and the acreage devoted to this was 16,250. The raising of flowers and plants and nursery products is also relatively important. To these, 1330 acres were devoted in 1909, and the output was valued at $1,308,937. The orchard fruits produced in 1909 were 1,874,000 bushels, valued at $1,327,000. Apples contributed more than four-fifths of this quantity, and peaches, nectarines, and pears most of the remainder. Small fruits in 1910 were valued at $316,752. Of these, strawberries were by far the most important.

The total value of live stock on the farms, including domestic animals, poultry, and bees, in 1910 was $14,164,000, of which domestic animals contributed $13,133,000. Cattle numbered 195,318, valued at $6,730,287; horses, 46,341, valued at $5,739,400; mules, 416, valued at $72,721; swine, 52,372, valued at $472,741; sheep, 22,418, valued at $112,349. Poultry of all sorts numbered 1,265,702, valued at $988,653. The number of dairy cows on the farms in 1910 was 122,853, and the amount of milk reported in that year was 45,750,000 gallons. Butter made on the farms was valued at $1,078,000.

Fisheries. The fisheries of the State are of

great commercial importance, ranking third among the New England States in the value of their product. The total value of fish in 1908 was $2,981,720. Of this product, oysters were the most valuable. Of these there were taken for market purposes 1,394,600 pounds, valued at $1,167,650, and for seeding purposes, 2,553,500 pounds, valued at $1,415,290. Next in order of value were menhaden, 28,636,000 pounds, valued at $93,350; lobsters, 661,300 pounds, valued at $84,280; cod, 820,300 pounds, valued at $26,720; flatfish and flounders, 707,100 pounds, valued at $21,260; and swordfish, 240,100 pounds, valued at $14,600. Among other fish taken in considerable quantities were alewives, mackerel, shad, weakfish, clams, and eels. There were 952 independent fishermen engaged in fishing in different parts of the State, and 1195 wage-earning fishermen were employed. The vessels engaged in fisheries numbered 237 and were valued at $795,364. The cash capital invested in the fisheries of the State was $572,290.

Manufactures. Connecticut is one of the most important of the manufacturing States. This prominence is due to several causes, the chief of which are the early establishment of a number of important industries in the State and the unusually large amount of capital available for investment in manufacturing industries. Additional causes are the comparatively abundant water power and its geographic location near New York City, with which many of the manufacturing centres of the State have direct water-transportation facilities. Bridgeport, New Haven, and New London are seaports of considerable prominence and afford ample opportunities for domestic coastwise commerce. In addition, the main line of the most important railroad system in New England, the New York, New Haven, and Hartford, crosses Connecticut and gives direct and adequate connection with all parts of the country. The growth and concentration of the population of the State have been closely related to the increase in the importance of its manufacturing industries. In 1849 an average of 50,731 wage earners, representing 13.7 per cent of the total population, were employed in manufactures, while in 1909 an average of 210,792 wage earners, or 18.9 per cent of the total population, were so engaged. In 1849 the total value of the manufactures of the State, including the products of the neighborhood and hand industries, amounted to $47,115,000, while in 1909, exclusive of the value of the products of the neighborhood and hand industries, it reached $490,272,000. These figures represent increases of 315.5 per cent in the number of wage earners, and 940.6 per cent in the value of products. During this period the gross value of the products per capita of the total population of the State increased from $127 to $440. In spite of this fact the State's proportion of the total value of products manufactured in the United States fell from 4.6 per cent in 1849 to 2.8 per cent in 1899 and 2.4 per cent in 1909.

The rank of Connecticut among the States in regard to the value of its manufactured products was twelfth in 1909, as compared with eleventh in 1899, and fifth in 1849. The most important data in relation to the manufactures of the State in 1909 in comparison with 1904 will be found in the table below. In this table, because of lack of space, only industries the value of whose products exceeded $2,000,000 in 1909 are included.

From this table it will be noted that in Connecticut in 1909 there were 4251 manufacturing establishments which gave employment to an average of 233,871 persons during the year and paid out $135,756,000 in salaries and wages. Of the total number of persons employed, 210,792 were wage earners. The value of the products, turned out by these establishments was $490,272,000, to produce which materials costing $257,259,000 were used. The value added by manufacture was thus $233,013,000, which represents the net wealth created by manufacturing operations during the year.

In general this table brings out the fact that the manufacturing industries of the State as a whole showed greater development during the more recent five-year period (1904–09) than during the preceding five-year period (1899–1904), although a marked increase is shown for both periods in all items except in the number of establishments from 1899 to 1904. During the later period the number of establishments increased 22.3 per cent, the average number of wage earners 16.1 per cent, the value of products 32.8 per cent, and the value added by manufacture 31.1 per cent.

Although a few industries predominate in importance, there is, on the whole, a wide diversity in manufacturing activities. The leading individual industries, measured by value of products, are those connected with brass and iron manufactures. They include the making of rolled brass and copper, which composed the major portion of the product, and of brass ware, in the manufacture of which Connecticut is particularly prominent. The State ranks first in the combined value of brass and bronze products, reporting 44.6 per cent of the total for the United States. The leading manufacturing industry in the State, however, is connected with textile manufactures. These include cotton goods; silk and silk goods; woolen, worsted, and felt goods; and hosiery and knit goods. These four branches in 1909 gave employment to an average of 34,992 wage earners, or 16.2 per cent of the total for all manufacturing industries in the State. The value of the products amounted to $70,460,000, or 14.4 per cent of the total value of manufactured products. Of the total value of products for these branches of the textile industry, 34.4 per cent was contributed by the cotton mills, 29.9 by the silk mills, 27.5 by the woolen and worsted mills, and 8.2 per cent by the hosiery and knitting mills.

The industries relating to foundry and machine-shop products are of greater importance than is indicated by the statistics. Some machine shops manufacture a distinctive product and are assigned to other classifications. The most important product is hardware, of which more than two-fifths of the total value reported for the United States in 1909 is reported from Connecticut. Some of the largest establishments, other than those producing hardware, were engaged in the manufacture of textile and metal-working machinery and internal-combustion engines.

The manufacture of firearms and ammunition is one of the State's most important manufacturing industries. It is now mainly centralized in New Haven and Bridgeport. The increase in the value of products was much greater from 1899 to 1904 than from 1904 to 1909, being 57.2 per cent and 12.3 per cent respectively for the two five-year periods. Connecticut is the lead-

COMPARATIVE SUMMARY FOR 1909 AND 1904

ALL INDUSTRIES COMBINED AND SELECTED INDUSTRIES

INDUSTRY	Census	Number of establishments	PERSONS ENGAGED IN INDUSTRY: Total	Proprietors and firm members	Salaried employees	Wage earners (average number)	Primary horse power	Capital	Salaries	Wages	Cost of materials	Value of products	Value added by manufacture
								Expressed in thousands					
STATE — All industries	1909	4,251	233,871	3,468	19,611	210,792	400,275	$517,547	$25,637	$110,119	$257,259	$490,272	$233,013
	1904	3,477	198,046	2,918	13,523	181,605	304,204	373,284	17,040	87,943	191,302	369,082	177,780
Automobiles, including bodies and parts	1909	28	4,444	8	621	3,815	3,937	12,131	634	2,878	4,856	11,668	6,812
	1904	7	1,131	4	62	1,065	1,283	3,713	86	748	1,163	2,644	1,481
Boxes, fancy and paper	1909	38	2,074	20	205	1,849	1,306	2,337	262	748	1,386	2,911	1,525
	1904	37	2,186	24	130	2,032	1,149	1,837	158	764	1,432	2,768	1,336
Brass and bronze products	1909	80	17,890	47	1,026	16,817	50,034	47,873	1,478	9,667	47,864	66,933	19,069
	1904	64	16,490	29	1,079	15,382	38,915	40,571	1,506	8,196	37,913	53,916	16,003
Bread and other bakery products	1909	431	2,611	467	275	1,869	658	2,532	169	1,222	4,463	7,310	2,847
	1904	327	2,376	355	270	1,751	557	2,260	183	1,019	3,446	5,898	2,452
Clocks and watches, including cases and materials	1909	16	6,195	5	339	5,851	4,273	9,846	415	3,030	2,098	7,390	5,292
	1904	13	6,137	2	370	5,765	3,699	8,288	364	2,939	2,116	7,060	4,944
Copper, tin, and sheet-iron products	1909	48	2,655	27	153	2,475	1,526	4,091	213	1,049	1,565	3,604	2,039
	1904	43	2,359	37	153	2,169	1,504	3,077	192	911	1,049	2,705	1,656
Corsets	1909	17	7,177	15	519	6,643	1,566	6,931	876	2,520	6,676	2,815	6,139
	1904	13	4,784	12	360	4,412	1,507	3,925	480	1,418	2,684	5,591	2,907
Cotton goods, including cotton small wares	1909	52	14,887	26	501	14,360	58,137	39,243	778	5,666	11,960	24,232	12,272
	1904	52	13,479	18	350	13,111	47,950	31,159	516	4,653	10,203	18,425	8,222
Cutlery and tools, not elsewhere specified	1909	82	8,094	45	502	7,547	14,135	13,758	751	3,980	3,310	10,717	7,407
	1904	71	6,170	43	374	5,753	8,658	8,090	479	3,098	2,830	8,336	5,506
Dyeing and finishing textiles	1909	10	1,817	3	95	1,719	5,851	5,375	198	872	1,480	3,562	2,082
	1904	10	1,496	2	88	1,406	4,883	4,562	162	640	927	2,215	1,288
Electrical machinery, apparatus, and supplies	1909	41	4,120	7	608	3,505	4,457	9,852	813	1,603	5,211	9,824	4,613
	1904	32	1,942	10	225	1,707	2,505	4,184	278	724	2,754	4,940	2,186
Firearms and ammunition	1909	10	9,205	1	671	8,533	9,391	21,681	1,048	4,968	10,066	19,948	9,882
	1904	13	8,049	9	347	7,693	5,125	11,776	562	4,601	8,311	17,762	9,451
Flour-mill and grist-mill products	1909	98	288	122	21	145	3,616	1,277	22	72	1,731	2,024	293
	1904	86	311	98	46	167	3,108	1,336	39	86	1,690	1,982	292
Foundry and machine-shop products	1909	403	42,101	202	4,163	37,736	49,167	89,715	5,144	21,332	24,820	65,535	40,715
	1904	349	32,545	204	2,513	29,828	32,248	57,909	3,148	15,417	15,362	44,816	29,454
Gas, illuminating and heating	1909	28	1,211		285	926	4,100	16,016	286	557	1,005	3,446	2,441
	1904	26	849	1	208	640	2,237	11,036	190	330	826	2,558	1,732
Hats, fur-felt	1909	80	5,877	59	601	5,217	5,619	7,144	574	3,384	4,849	10,400	5,551
	1904	56	5,664	57	449	5,158	3,729	3,352	427	2,696	3,954	8,663	4,709
Hosiery and knit goods	1909	21	3,524	2	182	3,340	3,540	6,464	324	1,363	3,049	5,801	2,752
	1904	24	3,703	7	102	3,594	3,642	5,815	163	1,305	2,825	5,371	2,546
Liquors, malt	1909	19	588	9	101	475	2,530	5,310	218	426	1,375	4,426	3,051
	1904	22	518	17	107	394	2,171	3,956	205	315	818	2,927	2,109
Lumber and timber products	1909	393	4,219	443	281	3,495	15,153	6,109	288	1,907	3,918	7,846	3,928
	1904	176	2,496	206	181	2,109	7,275	3,372	168	1,128	2,479	4,792	2,313
Musical instruments, pianos and organs, and materials	1909	17	2,469	5	160	2,304	2,559	5,627	312	1,251	3,022	5,538	2,516
	1904	17	2,715	6	126	2,583	2,224	5,226	240	1,337	2,402	5,273	2,871
Needles, pins, and hooks and eyes	1909	8	2,825	4	173	2,648	3,190	3,209	220	1,311	1,697	4,236	2,539
	1904	13	2,463	7	130	2,326	1,654	2,835	158	1,055	1,182	3,062	1,880
Paper and wood pulp	1909	51	1,920	24	176	1,720	19,509	7,195	351	924	3,303	5,527	2,224
	1904	50	1,933	29	154	1,750	18,021	5,893	236	843	2,738	5,039	2,301
Printing and publishing	1909	363	4,103	295	930	2,878	3,425	6,322	855	1,736	1,769	6,370	4,601
	1904	328	3,426	285	613	2,528	2,530	4,768	632	1,502	1,276	5,066	3,790
Silk and silk goods, including throwsters	1909	47	9,385	37	645	8,703	8,564	19,730	996	3,749	11,834	21,063	9,229
	1904	43	8,157	38	327	7,792	7,821	16,676	479	3,124	9,098	15,624	6,526
Silverware and plated ware	1909	31	6,812	5	584	6,223	5,751	17,247	967	3,446	7,232	15,837	8,605
	1904	22	4,161	2	305	3,854	3,500	10,569	450	2,099	3,640	8,126	4,486
Slaughtering and meat packing	1909	28	523	28	63	432	590	1,967	62	239	3,949	4,572	623
	1904	26	426	29	26	371	461	733	22	204	2,809	3,218	409
Tobacco manufactures	1909	265	1,861	289	59	1,513	48	1,370	57	908	1,064	2,738	1,674
	1904	226	1,593	253	73	1,267	24	1,174	70	766	852	2,350	1,498
Typewriters and supplies	1909	8	3,510	...	576	2,934	2,034	8,468	486	1,898	1,041	4,016	2,975
	1904	6	1,611	..	104	1,507	1,113	2,291	132	809	355	1,037	1,282
Wirework, including wire rope and cable	1909	28	1,557	20	117	1,420	1,517	2,487	197	684	1,648	3,345	1,697
	1904	29	1,417	20	136	1,261	2,410	2,444	210	575	1,249	2,600	1,351
Woolen, worsted, and felt goods, and wool hats	1909	56	8,140	31	320	7,789	17,518	20,011	564	3,485	12,838	19,363	6,525
	1904	59	7,748	39	280	7,429	14,949	15,031	416	2,998	10,073	15,483	5,410

ing State in the total value of the products of these industries. In 1909 the combined products of industries related to silverware formed over one-third of the total value for the country. Plated ware comprises the principal part of this industry. In 1904 and 1909 over two-thirds of the total value of plated ware in the United States was reported from Connecticut. Other manufacturing industries of great importance are those connected with the manufacture of corsets, automobiles, cutlery and tools, hats and fur-felt; electrical machinery, apparatus, and supplies; lumber and timber products; and clocks and watches, including cases and materials. In the last-named industry the State ranked first in the total value of products in 1909. Nine of the 16 establishments in the State were engaged primarily in the manufacture of clocks. This branch of the industry in Connecticut dates from early in 1800. Much of its early development took place in that State, where it has been largely centralized. The automobile industry showed greater rates of increase from 1904 to 1909 in value of products and in value added by manufacture than any other of the important industries of the State. Increases were also shown in the manufacture of silverware and plated ware, corsets, electrical machinery, apparatus and supplies, typewriters and typewriter supplies, and paint and varnish.

As is shown by the preceding table, the average number of persons engaged in manufactures during 1909 was 233,871, of whom 210,792 were wage earners. Wage earners included 157,659 males and 53,133 females. The wage earners under 16 years of age numbered 5421, of whom 2935 were male and 2486 female. The largest number of persons were engaged in manufactures relating to foundry and machine-shop products, 42,101; in the manufacture of brass and bronze products there were engaged 17,890; in the manufacture of cotton goods, 14,887; in the manufacture of silk and silk goods, 9385; and in the manufacture of firearms and ammunition, 9205. For the great majority of wage earners employed in the manufacturing industry in the State, the prevailing hours of labor ranged from 54 to 60 hours a week, only 8.4 per cent of the total number being employed in establishments where the prevailing hours are less than 54 a week, and but 1.4 per cent in establishments where more than 60 hours a week prevail.

In 1909, 68.2 per cent of the total value of products was reported from cities and boroughs having over 10,000 inhabitants, and 65.7 per cent of the average number of wage earners were employed in these places. The figures indicate that not only has a considerable change taken place during the last decade in the relative importance of the manufacturing industries of the different groups of cities and boroughs having over 10,000 inhabitants, but the combined industries of such places have gained considerably on those of the districts outside. The most important manufacturing city in the State is Bridgeport, in which in 1909 were 25,775 wage earners and a product valued at $65,608,806. In New Haven there were 23,547 wage earners and a product valued at $51,071,397; in Waterbury, 20,170 wage earners and a product valued at $50,349,816; in Hartford, 14,627 wage earners and a product valued at $40,667,598; in New Britain, 13,513 wage earners and a product valued at $22,021,241. Other cities in which the value of the manufactured products exceeded $10,000,000 in 1909 were Ansonia, Meriden, Torrington, Naugatuck, and Danbury. Every city and borough for which figures are available, except New London, shows an increase in the value of products in the decade 1899 to 1909. New London shows a decrease of 4.8 per cent from 1904 to 1909, due to the decline in shipbuilding. Bridgeport shows an increase in 1909, as compared with 1904, of 47.1 per cent in value of products and 32.2 per cent in the average number of wage earners. The gain in value of products was due largely to the increases in the output of automobiles, corsets, electrical machinery, foundry and machine-shop products, and gold and silver reducing and refining. New Haven shows an increase of 28.8 per cent in the value of products in 1904 to 1909, Waterbury 55.6 per cent, and Hartford 56.6 per cent.

Of the 4251 manufacturing establishments in 1909, only 93, or 2.2 per cent, had a value of product exceeding $1,000,000. These establishments, however, employed an average of 95,373 wage earners, or 45.2 per cent of the total number in all establishments, and reported 49.3 per cent of the total value of products and 44.7 per cent of the total value added by manufacture. Of the 93 establishments whose products in 1909 exceeded $1,000,000 in value, 13 were engaged in the manufacture of brass and bronze products, 4 in the manufacture of cotton goods, 3 in the manufacture of cutlery and edged tools, 14 in the manufacture of foundry and machine-shop products, 6 in the manufacture of silk goods, and 5 in the manufacture of silverware and plated ware.

Education. Connecticut has always been among the most progressive of the States in educational matters. Primary education was provided for at public expense from the earliest Colonial period, and the establishment of Yale University in 1701 afforded opportunities for higher education. The percentage of illiteracy in the State is low. In 1910, of the total population of 10 years or over of 901,026, 53,665 were illiterate, or 6 per cent. The illiterates in 1900 numbered 40,972, or 5.9 per cent. The increase in the decade in both number and percentage was due to the influx of foreign-born whites. In 1910 only 1707 persons of native parentage were illiterate, while the foreign-born white persons numbered 49,202 illiterate. The percentage of illiteracy among foreign-born whites was 15.4, compared with 16.3 in 1900.

The total school population according to the thirteenth census was, in 1910, 298,454. Of these 192,497 attended schools, or a percentage of 64.5 of all persons of school age. The report of the State Superintendent of Education for the school year 1911–12 shows a school population in 1911 of 255,692, and the number of scholars registered during 1911–12 was 197,852, which was greater than the number at the end of the previous year and much larger than the number at the end of the preceding year. Of the total number of children of school age, about 30,000 were from 4 to 7 years old, and were therefore not influenced by the compulsory-attendance law. The average number of days on which each child attended school was 160. The total number enrolled in the high schools of the State in 1911–12 was 15,322. The approved high schools numbered 55. The total number of teachers in 1911–12 was 5491, of whom 361 were men and 5130 women. The average wages per month for

women teachers was $57.87, and for men teachers $125.01. The estimated value of school property in 1913 was $20,982,007. The total expenditure for schools in 1912 was $6,122,367, or a cost of $34.98 for each child in attendance, and an expenditure per child of school age of $21.30, an advance of $6.50 in 10 years. Rural schools are under the supervision of trained men, in accordance with the supervision law passed in 1903. This law made possible the payment by the State of three-fourths of the salary of the supervisor in towns having less than 11 teachers, and one-half the salary in districts formed by the union of two or more towns having in all from 25 to 50 teachers. Decided beneficial results have followed this supervision of rural schools. Experimental trade schools were established in 1909. One of these is at New Britain and another at Bridgeport. These schools include departments of day school, continuation school, half-time school, evening school, vocational school, and special courses. There are normal schools at New Britain, Willimantic, New Haven, and Danbury. The Legislature of 1913 authorized the boards of education or school committees of any town or city to establish vocational guidance as a part of the educational system of these towns and cities. The same Legislature authorized the establishment and maintenance of schools with instruction in trades, useful occupations, and avocations in towns and cities.

There is no State university. The institutions for higher education are Trinity College (Protestant Episcopal), Hartford; Wesleyan University (nonsectarian), Middletown; and Yale University (nonsectarian), New Haven. The Connecticut College for Women (q.v.) at New London was founded in 1911. There is also a State agricultural college at Storrs. This is coeducational. There are schools of science, law, art, and medicine at Yale University. The Congregationalists have divinity schools at New Haven and Hartford, and the Protestant Episcopalians one at Middletown.

Militia. The organized militia of the State consists of two regiments and a separate company (colored) of infantry, two troops of cavalry, a battery of field artillery, a company of signal troops, and two companies of coast artillery corps, an ambulance company, and a field hospital. The total strength in 1913 was 2457 enlisted men and 184 officers. The official designation is the Connecticut National Guard.

Population. The population of the State from its early settlement to the present time is shown by the following figures: In 1637, 1800; in 1688, 17,000; in 1755, 133,000—3500 slaves; in 1787, 202,000; in 1800, 251,002; in 1840, 309,978; in 1860, 460,147; in 1890, 746,258; in 1900, 908,420; in 1910, 1,114,756. The estimated population on July 1, 1914, was 1,202,688. The increase in the decade 1900–10 was 206,336, or 22.7 per cent. The increase in the previous decade (1890–1900) was 21.7 per cent. The population per square mile in 1910 was 231.3 compared with 188.5 in 1900 and 154.8 in 1890. That a very large proportion of the population of the State is urban is shown by the fact that, in 1910, 999,839 persons lived in places of 2500 or more inhabitants, while only 114,917 were classed as rural. The urban population increased 25.9 per cent in the decade 1900–10, while the rural population gained only 0.8. The percentage of the population in places of 2500 or more in 1910 was 89.7 per cent. The native white population of native parentage in 1910 was 395,649. Native whites of foreign or mixed parentage numbered 374,489. Foreign-born whites numbered 328,759, compared with 237,396 in 1900. The percentage of native whites of native parentage of the whole population in 1910 was 35.5, compared with 41 per cent in 1900. The percentage of foreign-born whites in 1910 was 29.5 per cent, compared with 26.1 in 1900. The negro population in 1910 numbered 15,174, compared with 15,226 in 1900. Of the foreign-born white population, 58,457 were born in Ireland, 56,953 in Italy, 54,120 in Russia, 31,126 in Germany, 23,642 in Austria, and 22,422 in England. Of the total population of the State, in 1910, 563,642 were male and 551,114 were female. The total number of males of voting age was 347,692, compared with 280,340 in 1900. The largest cities in the State with their populations in 1910 and 1900 are as follows: New Haven, 1910, 133,605; 1900, 108,027—Bridgeport, 1910, 102,054; 1900, 70,996—Hartford, 1910, 98,915; 1900, 79,850—Waterbury, 1910, 73,141; 1900, 45,859—New Britain, 1910, 43,916; 1900, 25,998—Meriden, 1910, 27,265; 1900, 24,296—Stamford, 1910, 25,138; 1900, 15,997—Norwich, 1910, 20,367; 1900, 17,251. Nearly all these cities show an unusually large percentage of gain in the decade 1900–10.

Transportation. The transportation facilities of the State have to a large extent aided its development in manufactures. Bridgeport, New Haven, and New London are seaports of considerable prominence and afford ample opportunities for domestic coastwise commerce. Other ports of entry are Fairfield and Stonington. From several of these cities there are lines directly in connection with New York City. The railroad system of the State reached an early development and has in recent years been little extended. The main line of the most important railroad system in New England, the New York, New Haven, and Hartford, traverses the State and gives direct connection to all parts of the country. This corporation also controlled nearly all the electric railways, of which construction in recent years has been large until the order of dissolution issued from the Federal Department of Justice in 1914. The total length of the New York, New Haven, and Hartford Company's lines within the State, including tracks of all kinds, was, at the beginning of 1914, 1885 miles. The only other railroads of importance whose lines are within the State's borders are the Central New England Railway Company, with a mileage of 98, and the Central Vermont Railway Company, with a mileage of 80. The South Manchester Railway is a small line having about three miles of trackage. In January, 1912, there were eight companies operating electric railways in the State, and the miles of single track were 996. There is, in general, a good system of roads, in the care of which communities are assisted by the State. The Connecticut River is an important highway of commerce and transportation, and improvements in the river below Hartford have been carried on by the United States government in recent years. In 1911 the Federal government completed improvements in Bridgeport harbor, and in the same year a 12-foot channel in the harbor of New Haven was completed. In the latter harbor breakwaters were also built and a 12-foot anchorage basin.

The Public Utilities Commission has general charge of the regulation of railroad rates in the State.

Finance. The finances of the State have for several years been in an unsatisfactory condition. The expenditures have greatly exceeded the receipts and it has been necessary to resort to loans and bond issues. The total receipts for the fiscal year ending September 30, 1913, amounted to $7,192,045. In this is included a loan of $1,745,000, which was necessary to meet current expenses. The balance at the beginning of the fiscal year was $2,186,245. The expenditures for the period amounted to $9,062,857. The expenditures in excess of receipts amounted to $1,870,812. The balance in the treasury at the end of the fiscal year 1913 was $315,431. The bonded debt of the State amounted at the end of the fiscal year 1913 to $7,064,100, and the temporary loans as noted above to $1,745,000, making a total debt of $8,809,100. In 1906 the State had no debt, but a surplus of $265,270. This shows an increase for six years in the State's indebtedness of $8,759,138. In the latter part of 1913 the treasury issued $4,000,000 in 4% bonds in order to pay temporary loans and future expenditures. To some extent the condition results from delays in payments of taxes. There is no penalty for deferred payments and this delay has been injurious to the State. The chief sources of revenue are the taxation of railroads and insurance companies, savings banks, general taxes, and inheritance tax. From the last-named source there was received in 1913 $840,312. The chief expenditures are for education, public works, and the support of State institutions. The treasurer, comptroller, and tax commissioner of the State constitute a board of equalization of taxes.

Banks. On June 14, 1912, there were 78 national banks in the State. Their resources amounted to $127,596,241; deposits subject to check, $65,957,004; and savings deposits, $2,404,558. Of the seven State banks the resources amounted to $15,213,735; and deposits subject to check, $10,466,079. The savings banks numbered 85, with 595,360 depositors. In the number of depositors in the savings banks Connecticut is surpassed only by Massachusetts and New York, the resources amounting to $315,248,206 and the deposits to $280,311,885. In addition to these banks there were 37 loan and trust companies, with deposits subject to check amounting to $24,513,743, and savings deposits amounting to $8,815,816.

Charities and Corrections. The charitable and correctional institutions of the State are under the control of the State Board of Charities. The penal institutions include the Connecticut State Prison at Wethersfield and the various county jails. The reformatories include the Connecticut State Reformatory at Cheshire, the Connecticut School for Boys at Meriden, the Industrial School for Girls at Middletown, the House of the Good Shepherd at Hartford, and the Florence Crittenton Mission at New Haven. Provision for the insane is made by the Connecticut Hospital for the Insane at Middletown, the Norwich Hospital for the Insane at Norwich, and the Hartford Retreat at Hartford. There are in addition a number of private sanitariums for mental and nervous diseases. Other institutions are the Connecticut Colony for Epileptics at Mansfield, the School for Imbeciles at Lakeville, the American School for the Deaf at Hartford, and the Mystic Oral School at Mystic. There were 25 public hospitals in the various cities in the State and nine sanitariums for tuberculosis and special hospitals. Provision for disabled soldiers is made at Fitch's Home for Soldiers at Noroton and a Woman's Relief Corps Home at Cromwell. There are, besides these institutions mentioned, a large number of private homes for the aged, temporary homes for children, and private homes for the young. The Legislature of 1911 provided for the transfer from the State prison to the reformatory at Cheshire, subject to the approval of the directors of this institution, all male prisoners under 25, sentenced to less than five years' imprisonment. The same Legislature provided that a contract for convict labor may not be made for longer than four years. A prisoner in the State prison sentenced for an attempt to murder by assault or an attempt to poison may be paroled after two years. The expenditures of the State for delinquents, defectives, and dependents in 1912 were $1,381,707. The expenditures for lands, buildings, and equipment were $487,300, or a total expenditure of $1,869,007. The State Board of Charities is authorized to visit and inspect all institutions, public or private. It includes some of the functions of a prison commission and those of a lunacy commission, and may correct any abuses, providing that this is done in such a manner as not to conflict with any personal, corporate, or statutory rights. The members of the board receive no remuneration for their services, but their actual expenses are paid. The State has adopted the policy of placing in private families children committed to reformatory schools, as well as orphans.

Government. The constitution of the State was approved by the people in 1818. Thirty-five amendments had been adopted up to 1914. Amendments originate in the House of Representatives, and a proposed amendment must be continued to the next General Assembly and be published with the laws which may have been passed at the same session; and if two-thirds of each house at the next session of the Assembly shall approve the amendments proposed, they are transmitted to the town clerk in each town in the State. He shall present the amendment to the inhabitants for their consideration at a town meeting, and if a majority of the electors present at such meeting shall have approved the amendments, they are valid to all intents and purposes as a part of the constitution.

Executive.—The executive power in the State is vested in the Governor, who holds office for two years. The other executive officers are Lieutenant Governor, Secretary, Treasurer, and Comptroller. The salary of the Governor was increased in 1912 to $5000 a year and that of Lieutenant Governor to $1500.

Legislative.—The legislative power of the State is vested in two houses, the Senate and the House of Representatives. The official title of both houses is the General Assembly. The Senate is composed of not less than 24 and not more than 36 members, who are elected biennially on the Tuesday after the first Monday in November. The House of Representatives consists of electors residing in towns from which they are elected. Every town which contains a population of 5000 is entitled to send two representatives. The population of each town is determined by enumeration made under the au-

thority of the United States census next before the election of representatives is held. There are 35 senators and 258 representatives. Senators and representatives are elected for a two-year term, and receive for the regular session $300 each and mileage. Only mileage is allowed for extra sessions. Up to 1911 there was no limit to the duration of the session of the Legislature. In that year a constitutional amendment was adopted which provided for an adjournment *sine die* not later than the first Wednesday after the first Monday in June, following its organization.

Judiciary.—The judicial power of the State is vested in the supreme court of errors, a superior court, judges of the court of common pleas, district courts, police courts, and the judge of probate. Judges of the supreme court of errors and of the superior court are appointed by the General Assembly upon the nomination of the Governor. There are one chief justice of the supreme court of errors and four associate justices. The superior court consists of six judges. There are courts of common pleas for Hartford, New Haven, New London, Fairfield, and Litchfield counties, each with one judge, except in New Haven County, where there are judges respectively for the civil and criminal sides. There is a district court in Waterbury, and borough courts and justices of the peace in various towns and cities.

Suffrage and Elections.—Every male citizen of the United States who shall have attained the age of 21 years, and who shall have resided in the State for a term of one year next preceding, and in the town in which he may offer himself to be admitted to the privileges of an elector at least six months next preceding the time he may so offer himself, and shall sustain a good moral character, shall, on his taking such oath as may be prescribed by law, be an elector. Each person admitted to be an elector must be able to read in the English language any article of the constitution or any section of the statutes of the State before being admitted an elector.

The general election for Governor, Lieutenant Governor, Secretary, Treasurer, Comptroller, and members of the General Assembly, is held on the Tuesday after the first Monday in November, every two years. In 1905 a constitutional amendment was adopted providing for the use of voting machines and other mechanical devices for voting. In 1909 the Corrupt Practices Act and the Australian Ballot Law were amended. The Legislature of 1913 passed statutes making provision for the election of United States Senators in accordance with the seventeenth amendment to the Constitution.

Local Government.—Each town annually or biennially, as the electors may determine, selects such officers of local government as the laws may prescribe. Sheriffs are elected in the several counties every four years. There is no legislative provision for the commission form of government in towns and cities, but in 1911 the town of Bristol adopted a city charter which contained some features usually found in a commission form of government, including provisions for the initiative and referendum.

Miscellaneous Statutory Provisions. — No county, city, town, borough, or other municipality is permitted to subscribe to the capital stock of any railroad corporation, or to become a purchaser of the bonds, or to loan its credit directly or indirectly in aid of any such corporation. Real estate acquired by a married woman's services or conveyed to her for a consideration may be held for her own use. The husband is trustee of a wife's personal estate, which upon his death falls to her or her devisees, legatees, or heirs, as though she had never been married; and married women may convey by devise the same as single persons, except that a husband (if he have not abandoned her) must unite in conveying by deed. Divorce may be had for fraudulent contract, adultery, desertion, and neglect of duty for three years, habitual intemperance, cruelty, imprisonment for life, and for certain crimes; previous residence required. The sale of liquor is regulated by each town in accordance with local-option laws. The registration of voters is required in the State, and women are allowed to vote in elections for school officers. The legal rate of interest is 6 per cent. Judgments outlaw in 17 years; notes and accounts in six years. The eight-hour day is a maximum for mechanics in State institutions except in unavoidable emergencies. No minor under 16 and no woman of any age is permitted to be employed in a mercantile establishment, unless it is manufacturing or mechanical, more than 58 hours a week, except under certain conditions; and no child under 16 can be employed unless he has a certificate of elementary education. No child under 16 is permitted to run or adjust certain dangerous machinery. The Legislature of 1911 passed an elaborate measure forbidding blacklisting. Physicians are required to report to the State Commission of Labor cases of occupational diseases. In 1911 a measure was passed requiring the registration of airships and the licensing of aëronauts. This is probably the first State law dealing with aëronautics. The same Legislature passed an elaborate act providing for sanitation in tenements, boarding and lodging houses, and several other measures providing for the purity of milk and other food and regulating the sale of liquors and drugs. Tobacco must not be sold or given to minors under 16. Any combination to increase prices of necessities is punishable by a maximum fine of $1000 or by imprisonment or by both. The Legislature of 1913 created a State civil service commission to consist of three members appointed by the governor. This commission is required to classify all officers and places of employment in the State service which come under the provision of the Civil Service Act, which was passed at the same session. The same Legislature passed a measure providing for workmen's compensation in case of injury.

Religion. Connecticut was in its early days a refuge for the English Nonconformists. For a long time the Congregational church had almost the entire field to itself. The Unitarian movement made less progress in Connecticut than in other New England States. With the emigration to Western States of large numbers of the descendants of the original Colonial stock and the incoming of large numbers of foreigners —especially Irish and French-Canadian—a still greater religious change has taken place. In 1913 the Catholic population numbered 438,483; non-Catholic, 778,248.

History. In 1614 Adriaen Block, a native of Holland, discovered and explored the Connecticut River, but it was not till 1633 that the Dutch of New Amsterdam began a trading post at Suckiaug (Hartford). Two years earlier the

soil from Narragansett Bay to the Pacific Ocean was granted by the Earl of Warwick to Lord Saye and Sele, and others, but the transfer apparently had no legal basis. In 1633 traders from Plymouth visited the site of Windsor. Wethersfield in 1634, and Windsor and Hartford in the following year, were settled by emigrants from Massachusetts Bay. In 1635 the Saye and Sele patentees sent over John Winthrop, Jr., to act as Governor. He built a fort at Saybrook, preventing the Dutch from getting control of the Connecticut, and gave the settlers in the upper valley a conditional permission to remain. Desire for a more democratic government caused a new exodus from Massachusetts, and in 1636 Hartford, Windsor, and Wethersfield received their chief bodies of immigrants. In 1638–39 the three towns united in an independent commonwealth and adopted a thoroughly democratic constitution. The Massachusetts system of town government, transplanted to Connecticut, attained its fullest development in the three upper settlements, with which Springfield (Agawam) remained nominally associated till 1641. War with the Pequots, the most powerful of the Indian tribes, in 1637, led to their extermination, and the progress of colonization was never again hindered by the enmity of the natives. In 1638 New Haven was founded by a Puritan colony under the Rev. John Davenport, and from 1638 to 1640 Milford, Guilford, and Stamford on the mainland and Southold on Long Island were settled. Together with Branford these towns were united, between 1643 and 1651, into one "jurisdiction," known subsequently as the New Haven Colony, as opposed to the upper settlements, which constituted the Connecticut Colony. The laws of the Old Testament were made the rule for all courts. A somewhat similar code of laws in Connecticut gave rise in after years to the nickname "blue laws" (q.v.), although Connecticut, unlike New Haven, did not restrict the franchise and the holding of office to church members. In 1644 Connecticut bought the colony of Saybrook from Saye and Sele, and gradually (1644–62), by purchase and colonization, acquired the greater part of the present State and a considerable portion of Long Island. In 1657 John Winthrop, Jr., was chosen Governor of Connecticut, and by his skill in diplomacy procured, in 1662, a charter from Charles II granting absolute autonomy to that Colony. By this charter New Haven was incorporated with Connecticut, in spite of the most vehement opposition on the part of the former. New Haven, nevertheless, was forced to submit (1664). In October, 1687, Sir Edmund Andros came to Hartford and demanded the charter from the General Assembly, but it was carried away and secreted till 1689. (See CHARTER OAK.) From 1687 to 1689, however, the Colony was subject to the despotic rule of Andros. In 1708 the Congregational church system was established by the adoption of the Saybrook platform, and this was supplemented by the Act of 1742. Though other denominations were tolerated, church and state for a long time remained closely connected, and secular and religious affairs were under the control of the same authorities. In 1754 Connecticut bought from the Indians a large tract of land in the Wyoming valley in Pennsylvania and proceeded to settle it, but was compelled in 1782 to surrender it to Pennsylvania. In 1786 the Colony relinquished its charter rights to the territory west of its present limits and received in return the Western Reserve (q.v.). Emigration to the western lands, as well as to Vermont and New York, was active.

The passage of the Stamp Act was vigorously denounced by the General Assembly; in May, 1776, the Colony was declared released from its allegiance to England, and in October Connecticut was constituted an independent State. It contributed more than 30,000 men to the Revolutionary army, and its Governor, Jonathan Trumbull, was one of Washington's most trusted advisers. In 1777 the British burned Danbury and in 1779 pillaged New Haven. Forts Griswold and Trumbull, at New London, were taken on Sept. 6, 1781, by Benedict Arnold, and the town was destroyed. In the framing of the Federal Constitution Connecticut took a prominent part, and to its delegates was due the adoption of that feature of the Constitution which provides for State representation in the upper house of Congress and proportionate representation in the lower. Connecticut was always a stronghold of federalism; it strongly opposed the War of 1812, and its capitol was the meeting place of the celebrated Hartford Convention (q.v.). In 1818 a new constitution was framed, church and state were separated, and the franchise was widely extended. The General Assembly was divided into a Senate and a House of Representatives. The conservative and theocratic character of the government became greatly modified as the State developed from an agricultural region into a commercial and industrial centre. The shrewdness of the Connecticut trader and the preëminent ingenuity of the Connecticut mechanic raised the State to a high degree of prosperity. During the Civil War Connecticut gave to the Union cause nearly 60,000 troops and the services of her great War Governor, Buckingham. Progress was rapid after the war. In the matter of public instruction the State took one of the foremost places in the Union, if not the foremost, devoting the entire proceeds from the sale of its public lands to the support of the free schools. In the readjustment, however, of the balance of political power in conformity with changed political conditions, no like spirit of progress was shown, and in 1901 the necessity of electoral reform was discussed at length in the press of the State. Representation in the lower house being based on the old township divisions and not on population, it happened that great cities like New Haven and Bridgeport were dominated by rural communities with one-tenth their population. In many cases a state of things prevailed not far removed from conditions in England before the Reform Bill of 1832. The agitation resulted in the calling of a constitutional convention, which met in January, 1902, and drew up a scheme of redistribution which was submitted to the people on June 16. The measure provided for one representative from every town with a population of less than 2000, two representatives for towns between 20,000 and 50,000, three for towns between 50,000 and 100,000, and four for all cities over 100,000, with one additional for every 50,000 inhabitants above that number. The effect of the measure would have been to deprive some towns of one representative each and to assign these to the large towns. The plan, however, satisfied neither the conservatives nor the advocates of reform, and was voted down. In 1907 there was submitted to the people a con-

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The general election for Governor, Lieutenant Governor, Secretary, Treasurer, Comptroller, and members of the General Assembly, is held on the Tuesday after the first Monday in November, every two years. In 1905 a constitutional amendment was adopted providing for the use of voting machines and other mechanical devices for voting. In 1909 the Corrupt Practices Act and the Australian Ballot Law were amended. The Legislature of 1913 passed statutes making provision for the election of United States Senators in accordance with the seventeenth amendment to the Constitution.

Local Government.—Each town annually or biennially, as the electors may determine, selects such officers of local government as the laws may prescribe. Sheriffs are elected in the several counties every four years. There is no legislative provision for the commission form of government in towns and cities, but in 1911 the town of Bristol adopted a city charter which contained some features usually found in a commission form of government, including provisions for the initiative and referendum.

Miscellaneous Statutory Provisions.—No county, city, town, borough, or other municipality is permitted to subscribe to the capital stock of any railroad corporation, or to become a purchaser of the bonds, or to loan its credit directly or indirectly in aid of any such corporation. Real estate acquired by a married woman's services or conveyed to her for a consideration may be held for her own use. The husband is trustee of a wife's personal estate, which upon his death falls to her or her devisees, legatees, or heirs, as though she had never been married; and married women may convey by devise the same as single persons, except that a husband (if he have not abandoned her) must unite in conveying by deed. Divorce may be had for fraudulent contract, adultery, desertion, and neglect of duty for three years, habitual intemperance, cruelty, imprisonment for life, and for certain crimes; previous residence required. The sale of liquor is regulated by each town in accordance with local-option laws. The registration of voters is required in the State, and women are allowed to vote in elections for school officers. The legal rate of interest is 6 per cent. Judgments outlaw in 17 years; notes and accounts in six years. The eight-hour day is a maximum for mechanics in State institutions except in unavoidable emergencies. No minor under 16 and no woman of any age is permitted to be employed in a mercantile establishment, unless it is manufacturing or mechanical, more than 58 hours a week, except under certain conditions; and no child under 16 can be employed unless he has a certificate of elementary education. No child under 16 is permitted to run or adjust certain dangerous machinery. The Legislature of 1911 passed an elaborate measure forbidding blacklisting. Physicians are required to report to the State Commission of Labor cases of occupational diseases. In 1911 a measure was passed requiring the registration of airships and the licensing of aëronauts. This is probably the first State law dealing with aëronautics. The same Legislature passed an elaborate act providing for sanitation in tenements, boarding and lodging houses, and several other measures providing for the purity of milk and other food and regulating the sale of liquors and drugs. Tobacco must not be sold or given to minors under 16. Any combination to increase prices of necessities is punishable by a maximum fine of $1000 or by imprisonment or by both. The Legislature of 1913 created a State civil service commission to consist of three members appointed by the governor. This commission is required to classify all officers and places of employment in the State service which come under the provision of the Civil Service Act, which was passed at the same session. The same Legislature passed a measure providing for workmen's compensation in case of injury.

Religion. Connecticut was in its early days a refuge for the English Nonconformists. For a long time the Congregational church had almost the entire field to itself. The Unitarian movement made less progress in Connecticut than in other New England States. With the emigration to Western States of large numbers of the descendants of the original Colonial stock and the incoming of large numbers of foreigners —especially Irish and French-Canadian—a still greater religious change has taken place. In 1913 the Catholic population numbered 438,483; non-Catholic, 778,248.

History. In 1614 Adriaen Block, a native of Holland, discovered and explored the Connecticut River, but it was not till 1633 that the Dutch of New Amsterdam began a trading post at Suckiaug (Hartford). Two years earlier the

soil from Narragansett Bay to the Pacific Ocean was granted by the Earl of Warwick to Lord Saye and Sele, and others, but the transfer apparently had no legal basis. In 1633 traders from Plymouth visited the site of Windsor. Wethersfield in 1634, and Windsor and Hartford in the following year, were settled by emigrants from Massachusetts Bay. In 1635 the Saye and Sele patentees sent over John Winthrop, Jr., to act as Governor. He built a fort at Saybrook, preventing the Dutch from getting control of the Connecticut, and gave the settlers in the upper valley a conditional permission to remain. Desire for a more democratic government caused a new exodus from Massachusetts, and in 1636 Hartford, Windsor, and Wethersfield received their chief bodies of immigrants. In 1638–39 the three towns united in an independent commonwealth and adopted a thoroughly democratic constitution. The Massachusetts system of town government, transplanted to Connecticut, attained its fullest development in the three upper settlements, with which Springfield (Agawam) remained nominally associated till 1641. War with the Pequots, the most powerful of the Indian tribes, in 1637, led to their extermination, and the progress of colonization was never again hindered by the enmity of the natives. In 1638 New Haven was founded by a Puritan colony under the Rev. John Davenport, and from 1638 to 1640 Milford, Guilford, and Stamford on the mainland and Southold on Long Island were settled. Together with Branford these towns were united, between 1643 and 1651, into one "jurisdiction," known subsequently as the New Haven Colony, as opposed to the upper settlements, which constituted the Connecticut Colony. The laws of the Old Testament were made the rule for all courts. A somewhat similar code of laws in Connecticut gave rise in after years to the nickname "blue laws" (q.v.), although Connecticut, unlike New Haven, did not restrict the franchise and the holding of office to church members. In 1644 Connecticut bought the colony of Saybrook from Saye and Sele, and gradually (1644–62), by purchase and colonization, acquired the greater part of the present State and a considerable portion of Long Island. In 1657 John Winthrop, Jr., was chosen Governor of Connecticut, and by his skill in diplomacy procured, in 1662, a charter from Charles II granting absolute autonomy to that Colony. By this charter New Haven was incorporated with Connecticut, in spite of the most vehement opposition on the part of the former. New Haven, nevertheless, was forced to submit (1664). In October, 1687, Sir Edmund Andros came to Hartford and demanded the charter from the General Assembly, but it was carried away and secreted till 1689. (See CHARTER OAK.) From 1687 to 1689, however, the Colony was subject to the despotic rule of Andros. In 1708 the Congregational church system was established by the adoption of the Saybrook platform, and this was supplemented by the Act of 1742. Though other denominations were tolerated, church and state for a long time remained closely connected, and secular and religious affairs were under the control of the same authorities. In 1754 Connecticut bought from the Indians a large tract of land in the Wyoming valley in Pennsylvania and proceeded to settle it, but was compelled in 1782 to surrender it to Pennsylvania. In 1786 the Colony relinquished its charter rights to the territory west of its present limits and received in return the Western Reserve (q.v.). Emigration to the western lands, as well as to Vermont and New York, was active.

The passage of the Stamp Act was vigorously denounced by the General Assembly; in May, 1776, the Colony was declared released from its allegiance to England, and in October Connecticut was constituted an independent State. It contributed more than 30,000 men to the Revolutionary army, and its Governor, Jonathan Trumbull, was one of Washington's most trusted advisers. In 1777 the British burned Danbury and in 1779 pillaged New Haven. Forts Griswold and Trumbull, at New London, were taken on Sept. 6, 1781, by Benedict Arnold, and the town was destroyed. In the framing of the Federal Constitution Connecticut took a prominent part, and to its delegates was due the adoption of that feature of the Constitution which provides for State representation in the upper house of Congress and proportionate representation in the lower. Connecticut was always a stronghold of federalism; it strongly opposed the War of 1812, and its capitol was the meeting place of the celebrated Hartford Convention (q.v.). In 1818 a new constitution was framed, church and state were separated, and the franchise was widely extended. The General Assembly was divided into a Senate and a House of Representatives. The conservative and theocratic character of the government became greatly modified as the State developed from an agricultural region into a commercial and industrial centre. The shrewdness of the Connecticut trader and the preëminent ingenuity of the Connecticut mechanic raised the State to a high degree of prosperity. During the Civil War Connecticut gave to the Union cause nearly 60,000 troops and the services of her great War Governor, Buckingham. Progress was rapid after the war. In the matter of public instruction the State took one of the foremost places in the Union, if not the foremost, devoting the entire proceeds from the sale of its public lands to the support of the free schools. In the readjustment, however, of the balance of political power in conformity with changed political conditions, no like spirit of progress was shown, and in 1901 the necessity of electoral reform was discussed at length in the press of the State. Representation in the lower house being based on the old township divisions and not on population, it happened that great cities like New Haven and Bridgeport were dominated by rural communities with one-tenth their population. In many cases a state of things prevailed not far removed from conditions in England before the Reform Bill of 1832. The agitation resulted in the calling of a constitutional convention, which met in January, 1902, and drew up a scheme of redistribution which was submitted to the people on June 16. The measure provided for one representative from every town with a population of less than 2000, two representatives for towns between 20,000 and 50,000, three for towns between 50,000 and 100,000, and four for all cities over 100,000, with one additional for every 50,000 inhabitants above that number. The effect of the measure would have been to deprive some towns of one representative each and to assign these to the large towns. The plan, however, satisfied neither the conservatives nor the advocates of reform, and was voted down. In 1907 there was submitted to the people a con-

stitutional amendment providing for a revised constitution. This, in effect, was the old constitution with the amendments included in the body of the document instead of being added as an appendix. The only change was in the term for judge of probate, which was made four years. The amendment was defeated. In the presidential election of 1908 Taft received 112,815 votes; Bryan, 68,225. G. L. Lilley, Republican, was elected Governor. On October 6 of that year a new stone bridge between Hartford and East Hartford, costing $3,000,000 and said to be the finest structure of its kind in the world, was dedicated with appropriate ceremonies. Governor Lilley died April 2, 1909, and was succeeded by Lieutenant Governor Frank B. Weeks. On Jan. 20, 1910, Frank B. Brandegee was reëlected United States Senator. Simeon E. Baldwin, former Chief Justice of the State, was elected Governor. This was the first election of a Democratic governor in the State since 1893. In January, 1911, George P. McLean was elected United States Senator to succeed Morgan G. Bulkeley. The Democrats in 1912 renominated Governor Baldwin. The Republicans nominated Judge J. P. Studley, and the Progressives Henry Knox Smith, former United States Commissioner of Corporations. In the election of November 5, 1912, Wilson received 74,561 votes; Taft, 68,324; Roosevelt, 34,129; Debs, 10,056. For Governor, Baldwin received 78,274; Studley, 67,531; Smith, 31,020. The Democrats elected representatives in all five districts and all the State officers. In national elections Connecticut has been in general Federalist, Whig, and Republican; but it cast its vote for Monroe in 1820, for Van Buren in 1836, for Pierce in 1852, for Tilden in 1876, for Cleveland in 1884, 1888, and 1892, and for Wilson in 1912. The State has seven votes in the electoral college.

COLONIAL GOVERNORS

Connecticut Colony

	Years		Years
John Haynes	1639–40	John Webster	1656–57
Edward Hopkins	1640–41	John Winthrop	1657–58
John Haynes	1641–42	Thomas Welles	1658–59
George Wyllys	1642–43	John Winthrop	1659–76
John Haynes	1643–44	William Leete	1676–83
Edward Hopkins	1644–45	Robert Treat	1683–87
John Haynes	1645–46	Edmund Andros	1687–89
Edward Hopkins	1646–47	Robert Treat	1689–98
John Haynes	1647–48	Fitz John Winthrop	1698–1707
Edward Hopkins	1648–49	Gurdon Saltonstall	1707–24
John Haynes	1649–50	Joseph Talcott	1724–41
Edward Hopkins	1650–51	Jonathan Law	1741–50
John Haynes	1651–52	Roger Wolcott	1750–54
Edward Hopkins	1652–53	Thomas Fitch	1754–66
John Haynes	1653–54	William Pitkin	1766–69
Edward Hopkins	1654–55	Jonathan Trumbull	1769–76
Thomas Welles	1655–56		

New Haven Colony

	Years		Years
Theophilus Eaton	1639–57	William Leete	1661–65
Francis Newman	1658–60		

STATE GOVERNORS

		Years
Jonathan Trumbull	Federalist	1776–84
Matthew Griswold	"	1784–86
Samuel Huntington	"	1786–96
Oliver Wolcott	"	1796–98
Jonathan Trumbull	"	1798–1809
John Treadwell	"	1809–11
Roger Griswold	"	1811–13
John Cotton Smith	"	1813–17
Oliver Wolcott	"	1817–27
Gideon Tomlinson	"	1827–31
John S. Peters	Whig	1831–33
H. W. Edwards	Democrat	1833–34
Samuel A. Foote	Whig	1834–35
H. W. Edwards	Democrat	1835–38
W. W. Ellsworth	Whig	1838–42
C. F. Cleveland	Democrat	1842–44
Roger S. Baldwin	Whig	1844–46
Isaac Toucey	Democrat	1846–47
Clark Bissell	Whig	1847–49
Joseph Trumbull	"	1849–50
Thomas H. Seymour	Democrat	1850–54
Henry Dutton	Whig	1854–55
W. T. Minor	Know-Nothing	1855–57
A. H. Holley	Whig	1857–58
W. A. Buckingham	Republican	1858–66
Joseph R. Hawley	"	1866–67
James E. English	Democrat	1867–69
Marshall Jewell	Republican	1869–70
James E. English	Democrat	1870–71
Marshall Jewell	Republican	1871–73
Charles R. Ingersoll	Democrat	1873–76
R. D. Hubbard	"	1876–79
C. B. Andrews	Republican	1879–81
H. B. Bigelow	"	1881–83
Thomas M. Waller	Democrat	1883–85
Henry B. Harrison	Republican	1885–87
Phineas C. Lounsbury	"	1887–89
Morgan G. Bulkeley	"	1889–93
Luzon B. Morris	Democrat	1893–95
O. Vincent Coffin	Republican	1895–97
Lorrin A. Cooke	"	1897–99
George E. Lounsbury	"	1899–1901
George P. McLean	"	1901–03
Abiram Chamberlain	"	1903–05
Henry Roberts	"	1905–07
Rollin S. Woodruff	"	1907–09
George L. Lilley	"	1909
Frank B. Weeks	"	1909–11
Simeon E. Baldwin	Democrat	1911–

Consult: Trumbull, *The Colonial Records of Connecticut* (Hartford, 1850–59); Levermore, *The Republic of New Haven* (Baltimore, 1886); Norton, *The Governors of Connecticut* (Hartford, 1905); Morgan, *Connecticut as a Colony and as a State* (4 vols., ib., 1904); *Public Acts* (ib., 1911); *Register and Manual* (ib., 1912); Stoughton, *Corner Stone of Colonial Commerce* (Boston, 1911); Rice and Gregory, "Manual of the Geology of Connecticut," in *Bulletin No. 6 of the Connecticut Geological and Natural History Survey.*

CONNECTICUT COLLEGE FOR WOMEN. An institution for the higher education of women at New London, Conn., chartered on April 4, 1911. It owes its foundation to the wish and purpose of the people of Connecticut to provide within the State adequate facilities for the higher education of women. Its scope of instruction includes the humanities, sciences and arts, and it gives the degrees of A.B. and B.S. At a later date it is proposed to introduce graduate curricula leading to the A.M. degree. Instruction is given in music and in the fine and applied arts. The college campus comprises 340 acres in the northern limits of New London. The academic group of buildings is designed to be the centre of the general scheme of the building plan of the college. It will comprise the college hall, the library, convocation hall and chapel, museum, science buildings, and arts buildings. In convenient proximity to the central group will be ranged the residence group and the buildings needed in the athletic and social activities of the students. The architectural style for the buildings is in general the domestic Tudor, with the associated Collegiate Gothic for certain of the larger edifices. The college has received generous gifts of money, including a benefaction from Hon. Morton F. Plant, who provided for general maintenance by a gift of an endowment of $1,000,000 and for the housing of students by a building fund of $100,000, for the erection of the Plant and Blackstone dormitories. The trustees in June, 1913, authorized the erection of an initial group of five buildings adequate for the use of the college at the outset.

Construction on these buildings began in the spring of 1914. The official date for the opening of the college is September, 1915. The president is Fred H. Sykes, A.M.

CONNECTICUT LAKES. A chain of four lakes in Coos Co., N. H. (Map: New Hampshire, G 1). The "First," or Connecticut, Lake is 4 miles long, 2¾ miles wide, and 1618 feet above the sea. Four miles northeast is the "Second" Lake, 2¾ miles long, 1 mile wide, and 1882 feet above the sea. The "Third" Lake, about 7 miles farther north and ½ mile from the Canadian boundary, is 2028 feet above the sea, and has an area of about ¾ of a square mile. "Fourth" Lake, a mere pond, the last of the chain and the source of the Connecticut River (q.v.), is northwest of the "Third" Lake, near the Canadian boundary line, and 2551 feet above the sea. For some description of these lakes, consult Bacon, *The Connecticut River and the Valley of the Connecticut* (New York, 1906).

CONNECTICUT RIVER. A river of the United States, rising in the beautiful Connecticut lakes (q.v.), in northern New Hampshire, 2551 feet above sea level (Map: Connecticut, F 4). It flows southwest and south, forming the boundary between New Hampshire and Vermont, and enters Massachusetts near South Vernon, Vt. From this point it continues nearly due south across the State and enters Connecticut, where at Middletown it turns towards the southeast and, completing its course across the State, empties into Long Island Sound at Saybrook. The Connecticut River, the longest in New England, is 375 miles long and drains an area of about 11,083 square miles; in the lower part of its course (from Deep River) its width varies from 750 feet to half a mile, but generally does not exceed a quarter of a mile. Its mean discharge at Hartford is about 19,000 cubic feet per second. It is navigable to Hartford, 49.5 miles, for large steamers, and by means of the Windsor locks small boats may ascend to Holyoke. Fluctuations due to the tide are 3.4 feet at Saybrook, 1.8 feet at Middletown, and about 1.2 feet at Hartford. At Deep River (12 miles from the Sound) the water is distinctly brackish, but 2 miles farther up it is virtually fresh. Usually the river is closed by ice from about the middle of January to about the middle of March. The river falls rapidly at places and furnishes extensive water power. The principal falls and their heights are: Holyoke, 59 feet; Turner's, 41 feet; Bellows Falls, 54.5 feet; Olcott, 36 feet; and the Fifteen-Mile Falls. The principal tributaries from New Hampshire are the upper and lower Ammonoosuc and the Ashuelot; from Vermont, the Passumpsic, White, and West. In Massachusetts the chief tributaries from the east are the Chicopee and the Miller; from the west, the Deerfield and the Westfield. The only considerable affluent in Connecticut is the Farmington River, which rises in Massachusetts and empties into the main stream 6 miles above Hartford. The chief towns on its course are Wells River, Bellows Falls, Walpole, Brattleboro, Greenfield, Northampton, Holyoke, Chicopee, Springfield, Hartford, and Middletown. Consult Bacon, *The Connecticut River and the Valley of the Connecticut* (New York, 1906), and for a detailed description of the river below Hartford, the Report on the "Connecticut River up to Hartford," by the Engineering Corps of the United States War Department, in *House Document No. 1294*, 61st Congress, 3d session (1911).

CONNECTIVE TISSUE. The most widely distributed tissue of the body. Its function, in whatever modification it occurs, is to support and connect the tissues of the animal frame. It originates in the middle or mesoblastic layer of the embryo, and the differentiation which occurs and which distinguishes the different forms of connective tissue takes place mainly in the intercellular substance. Thus the intercellular substance may be soft and gelatinous, as in mucous connective tissue, or dense and firm, as in fascia and tendon, or hard, as in bone. The cells of connective tissue begin as small, round mesoblastic cells. Either directly from these cells or under their influence there is formed between the cells an intercellular substance, which, as stated, varies in character, and during the formation of which various changes take place in the cells themselves. Connective tissue has a relatively poor blood supply, is scantily furnished with nerves, but abounds in lymphatics.

The principal types of connective tissue are as follows: 1. White fibrous connective tissue. 2. Yellow elastic connective tissue. 3. Developmental forms of connective tissue, (*a*) mucous and (*b*) embryonal. 4. Cartilage. 5. Bone and dentine. 6. Adipose tissue or fat. 7. Neuroglia, the connective tissue of the nervous system. Of these forms of connective tissue, fat, cartilage, bone, and neuroglia (see NERVOUS SYSTEM) represent the more highly specialized types and will be found described in articles under their respective names. The remaining represent those forms of connective tissue to which the term usually refers. *White Fibrous Connective Tissue.*—This constitutes the subcutaneous connective tissue and intermuscular septa, where it is known as areolar tissue; it also forms the ligaments, tendons, and the framework of all the organs. Its cellular elements consist of fixed connective-tissue cells and the so-called wandering cells. The fixed cells are mainly irregular or fusiform in shape, with very little cell body. Much less numerous are the so-called plasma cells of Waldeyer and the granule cells. Some connective-tissue cells, such as many of those found in the choroid coat of the eye, are densely pigmented. The wandering connective-tissue cells are probably identical with the white blood corpuscles. (See BLOOD.) In the intercellular substance two kinds of fibres are found, white fibres and yellow elastic fibres. The former occur in broad wavy bundles composed of minute fibrils; the elastic fibres are narrow, glistening, apparently homogeneous bands which branch and anastomose. There is much variation in the relative number of cells and fibres, the softer tissues being more cellular, the more dense tissues, such as tendon, being almost entirely composed of fibres. *Yellow Elastic Tissue.*—This may occur almost pure in some parts of the body, as in the *ligamentum nuchæ*. (See NECK.) In such tissue, instead of the fine delicate fibres described above, the fibres are large and coarse. *The Developmental Forms of Connective Tissue.*—The mucous tissue constitutes the Wharton's jelly of the umbilical cord, the embryonal connective tissue found in fœtal life. In mucous tissue the cells are stellate, with long branching processes which anastomose with those of other cells. The intercellular substance

is gelatinous, with only a few fibres. In the adult an example of mucoid connective tissue is seen in the vitreous humor of the eye. Here the cells have disappeared, and only the jelly remains.

CON'NELLEY, WILLIAM ELSEY (1855–). An American author, born in Johnson Co., Ky. He became the director of the Kansas State Historical Society and published several works on the early history of Kansas, Indian traditions, and folklore. Among these are: *Wyandot Folk-Lore* (1899); *Kansas Territorial Governors* (1900); *John Brown—the Story of the Last of the Puritans* (1900); *Doniphan's Expedition* (1907); *Quantrill and the Border Wars* (1909); *The Ingalls of Kansas* (1909); *Eastern Kentucky Papers* (1910); *Life of Preston B. Plumb* (1913). He was greatly assisted in his researches by his knowledge of the Indian languages, as exemplified in his publication of a vocabulary of the Wyandot tongue.

CON'NELLSVILLE. A city in Fayette Co., Pa., 57 miles southeast of Pittsburgh, on the Baltimore and Ohio, the Pennsylvania, the Western Maryland, and the Pittsburgh and Lake Erie railroads, and on the Youghiogheny River (Map: Pennsylvania, B 8). It has a park, fine municipal and public library (Carnegie) buildings, and is the seat of a State hospital (miners). The city is the centre of the Connellsville coke region, the most important seat of coke production in the United States. Until 1903 the coke output of this region was from 40 to 50 per cent of the total output of the United States. The estimated output in 1912 was 20,000,837 short tons. The city contains also machine and car shops, and glass works, steam-pump factory, railroad repair shops, etc. Settled in 1770, Connellsville was erected into a township and named (in honor of Zachariah Connell, the founder) in 1793 and was incorporated as a borough in 1806. It is governed by a mayor, who holds office for three years, and a common council. Connellsville contains the grave of Edward Braddock, the Irish general with whom Washington fought in the French and Indian Wars. Pop., 1890, 5629; 1900, 7160; 1910, 12,845.

CONNEMARA, kŏn'nĕ-mä'rȧ (Ir. *Conmaone-mara*, seaside of the descendants of Conmac, the second of the three sons of Maeve, the English Mab, reputed Queen of Connaught in the first century A.D.). A district, 30 miles long by 15 to 20 broad, in the west of Galway, Ireland, between the bays of Kilkieran and Ballinakill. The name is often applied to the whole western part of County Galway (Map: Ireland, B 3). It has most fertile territory, though the coast is rocky, with abundant fishing, but the land has never been developed. Building stone and a green variety of marble, well adapted for decorative work, are extensively quarried. Peaks of mountains attain 2700 feet and are known to contain rich ore deposits.

CON'NER, DAVID (1792–1856). A United States naval officer, born in Pennsylvania. He entered the United States navy as a midshipman in 1809 and during the War of 1812 served as lieutenant on the *Hornet* in her engagements with the *Peacock* and the *Penguin*. He became commodore of the West India and home squadron in 1843 and, at the outbreak of the Mexican War, blockaded the Gulf ports. In his flagship, the *Raritan*, he led the attack on Vera Cruz in 1847 (see VERA CRUZ, CAPTURE OF) and landed General Scott's army of invasion. Commodore Conner was the first United States naval officer to use steamships in warfare. He was commandant of the Philadelphia Navy Yard at the time of his death.

CONNERSVILLE. A city and the county seat of Fayette Co., Ind., 57 miles east of South Indianapolis, on the Cincinnati, Hamilton, and Dayton, the Cleveland, Cincinnati, Chicago, and St. Louis, and the Fort Wayne, Cincinnati, and Louisville railroads, and on the White Water River (Map: Indiana, D 3). Among its features are a Carnegie library, a high-school building, Roberts Park, and Fayette Sanitarium. Connersville manufactures automobiles, pianos, paper, gloves, brick, blowers, carriages, mirrors, furniture, triple signs, overalls, and flour. The water works are the property of the city. Connersville was incorporated in 1813 and is governed by a mayor, elected biennially, and a council. Pop., 1900, 6836; 1910, 7738.

CONNOISSEUR, kŏn'nĭs-sēr' *or* -sōōr' (Fr., one who knows). A person who, without being an artist, is sufficiently acquainted with any fine art to pass competent judgment upon it. The Italians call such persons *cognoscenti*. See DILETTANTE.

CONNOISSEUR, THE. A weekly publication conducted by George Colman the Elder and Bonnel Thornton from the early part of 1754 to 1756. In it the first published work of William Cowper appeared, entitled *Keeping a Secret*.

CON'NOLLY, JAMES BRENDAN. An American author, born in South Boston, Mass. From 1890 to 1895 he acted as clerk and surveyor with the United States Engineering Corps at Savannah, Ga. He took an active interest in athletics and in 1896 won the first Olympian championship of modern times. In the Spanish-American War he served with the Ninth Massachusetts Infantry, and in 1907–08 he served in the United States navy. His writings, dealing chiefly with the sea, include: *Jeb Hutton* (1892); *Out of Gloucester* (1902); *The Sciners* (1904); *The Deep Sea's Toll* (1905); *The Crested Seas* (1907); *An Olympic Victor* (1908); *Open Water* (1910); *Wide Courses* (1912); *Sonnie-Boy's People and Other Stories* (1913).

CONNOR, RALPH. The pen name of Rev. Charles W. Gordon (q.v.).

CON'NOR, SELDEN (1839–). An American soldier. He was born in Fairfield, Me., and in 1859 graduated at Tufts College. At the beginning of the Civil War he enlisted in the First Vermont Volunteers, but later joined the Nineteenth Maine Volunteers, of which he became colonel, and was severely wounded in the battle of the Wilderness. In 1864 he was commissioned brigadier general of volunteers, but in 1866 was mustered out of service. He was Governor of Maine in 1876–78. Subsequently he was United States pension agent (1882–86), in 1890 became president of the Society of the Army of the Potomac, in 1896–99 was senior vice commander in chief of the Order of the Loyal Legion, and in 1897 was again appointed pension agent. His address on *Hannibal Hamlin* was published in 1909.

CON'NOTA'TION (from Lat. *connotare*, to connote, from *com-*, together + *notare*, to note, from *nota*, mark, from *noscere*, to know; connected with Gk. *γιγνώσκειν*, *gignōskein*, Eng. *know*) OF A TERM. In logic, the quality or totality of qualities an object must possess in order to be appropriately designated by a given term. Thus, the connotation of the term "ani-

mal" consists of all those qualities (organized physical constitution, sensitiveness, etc.) which any object must possess if it is properly to be called an animal. In earlier logical theory, under the influence of Platonic realism, it was assumed that connotation was unvarying; but more recently it has been recognized that the connotation of a term varies from individual to individual and from time to time. Synonyms of connotation are intension, comprehension, depth. (See DENOTATION.) A *connotative term* is one which has a connotation and is said to *connote* the qualities by virtue of which objects have a right to be designated by the term and to *denote* the objects possessing these qualities.

CO'NODONTS (from Gk. *κῶνος, kōnos,* cone + *ὀδούς, odous,* tooth). Minute fossil teeth of uncertain affinities, found in rocks of Ordovician to Permian age of North America and Europe. They are very small, shining objects, with more or less extended bases, from which arise one or many slender, sharp, short, or long denticles. They thus vary in form from conical to pectinate according to the number and length of the denticles. The material of which they consist is red, brown, or white calcite or phosphate of lime. Associated with the toothlike forms are minute plates of the same material, that probably belonged to the same organisms. Conodonts were first described by Pander, in 1856, from the lowest fossiliferous (Cambrian) rocks of Russia and were by him regarded as fish teeth. Since then they have been found in England, the United States, and Canada, and various opinions have been expressed regarding their affinities. Newberry described a number from the Carboniferous shales of Ohio and compared them to the teeth of myxinoid fishes. Other authors have considered them to be the spines of crustacea or the lingual teeth of naked mollusks. These opinions are all less well supported by facts than is that of Zittel and Rohon, that conodonts are the teeth of annelids allied to the Nereidæ. In the same rocks with conodonts are often found jaws of annelids, described as *Prioniodus, Polygnathus,* etc. Consult: Pander, *Monographie der fossilen Fische des silurischen Systems* (St. Petersburg, 1856); Hinde, "On Conodonts from the Chazy and Cincinnati Groups," etc., in *Quarterly Journal Geological Society,* vol. xxxv (London, 1879); Newberry, *Palæontology of Ohio,* vol. ii (Columbus, Ohio, 1875); Zittel and Rohon, "Ueber Conodonten," in *Sitzungsberichte der königlich-bayerischen Akademie der Wissenchaften* (Munich, 1886). See WORM, FOSSIL; ANNULATA.

CO'NOID (Gk. *κωνοειδής, kōnoeidēs,* cone-shaped, from *κῶνος, kōnos,* cone + *εἶδος, eidos,* shape). A conoidal surface is a skew surface generated by the motion of a straight line which always meets a fixed straight line, is parallel to a fixed plane, and touches a given curve or obeys some other law. Commonly speaking, a conoid is a solid generated by the revolution of any conic section about one of its principal axes. For example, the earth is practically a particular form of conoid. Speaking more technically, the term is used to designate quadrics of revolution, as the surfaces of paraboloids, ellipsoids, and hyperboloids. Cones, cylinders, and conoids are special forms of ruled surfaces. Wallis (1663) effected the cubature of a conoid with horizontal directing plane, whose generatrix intersects a vertical directing straight line and vertical directing circle.

CON'OLLY, JOHN (1794–1866). An English alienist. He was born at Market-Rasen, Lincolnshire, and studied medicine at the University of Edinburgh. In 1839 he became director of the Middlesex Asylum at Hanwell. Immediately after his installation he abolished all the devices theretofore employed to confine and restrain the insane by means of strait-jackets, straps, and similar appliances. During the period in which he was connected with the institution (1839–51) he succeeded in completely revolutionizing the treatment of mental disease, and his so-called "no-restraint system" found rapid extension everywhere. Among his principal works may be mentioned: *Construction and Government of Lunatic Asylums* (1847); *The Treatment of the Insane without Mechanical Restraints* (1856); *Essay on Hamlet* (1863).

CO'NON (Lat., from Gk. *Κόνων, Konōn*). A distinguished Athenian commander. He first came into prominence in 413 B.C., when he was chosen admiral for the year. In 407 B.C. he was appointed one of 10 generals to succeed Alcibiades, but was defeated by Callicratidas at Mitylene. In 405 he was defeated by Lysander at Ægospotami, but succeeded in escaping with eight ships to Cyprus. In 394 he commanded the combined fleets of Persia and Athens which defeated the Spartans at Cnidus. By this victory he restored to the Athenians control of the sea. He afterward rebuilt the Long Walls of Athens and the fortifications of the Piræus. In 392 he was sent as envoy to the Persian Tiribazus, by whom he was thrown into prison and, according to some, put to death. According to the more probable account, he escaped, and died at the court of Evagoras in Cyprus.

CONON OF SAMOS. A Greek astronomer and mathematician, of the third century B.C. His work on Astronomy included a collection of the solar eclipses observed by the Chaldæans. His studies in conic sections formed the basis of book iv of the famous work on that subject by Apollonius of Perga (q.v.). He is best known, however, in connection with the cluster of stars known as the *Coma Berenices.* When Ptolemy III Euergetes was making war on Syria, his wife, Berenice, to insure his safe return, consecrated her hair in the temple of the deified Arsinoë, on the promontory of Zephyrium. When the hair was reported missing from the temple, Conon declared it had been placed among the stars: to prove his assertion he pointed out the constellation still known as *Coma Berenices,* which had not previously been distinguished. The story was treated by Callimachus, and by Catullus in his sixty-sixth poem.

CO'NOSCOPE (from Gk. *κῶνος, kōnos,* cone + *σκοπεῖν, skopein,* to view). A polariscope adapted to the study of crystals, having a revolving stage for regulating the position of the crystal section under examination, two Nicol's prisms (polarizer and analyzer) for production of double polarized light, a strongly convergent lens system below the stage to cause the light to enter the crystal in a cone of rays, and a similar system above the stage to correct the divergence of the rays, so that the eye may focus them for the retina. A conoscope is chiefly used to examine the so-called interference figures of crystals. The mineralogical or petrological microscope is constructed so as to be used either as a stauroscope or a conoscope. See POLARISCOPE.

CON'QUEROR, THE. A surname popularly

given to William, Duke of Normandy, on becoming King of England.

CONQUEST (from OF. *conqueste*, Fr. *conquête*, Sp., Portug., It. *conquista*, from ML. *conquista*, conquest, from Lat. *conquirere*, to procure, from *com-*, together + *quærere*, to seek). The forcible extension of sovereignty by one state over the territory of another as the result of successful war. Though it is denied, by advocates of natural justice, that this carries with it inherent rights of appropriation in territory, and destruction of national life, conquest has been one of the strongest agencies in molding civilization, and, in its influence upon the relationship of nations, it belongs to the realm of international law as well as to that of history.

Military conquest is developed from mere occupation of territory when the victorious state exercises continuously sovereign powers over the territory affected, and such conquest is deemed to be completed in the legal sense by the conqueror's signifying by some formal act his intention of adding it to his dominions, such as the publication of a diplomatic circular or a proclamation of annexation. The conditions justifying such acquisition and insuring immunity from interference by other states are: 1. A situation where, in order to redress a wrong or in self-protection, it becomes necessary to strip an aggressor of a portion of his territory. 2. The completion by treaty of the title which possession by conquest has given. 3. A general acquiescence in the act of the conqueror by neutral states. The changes in the map of Europe wrought by Napoleon's conquests and annexations were not accepted by the nations affected, and, by the Congress of Vienna, a return to the original conditions was made.

Title by conquest is, in principle, to be distinguished from title by cession, by the fact that, whether ratified by treaty or not, it rests avowedly on force, whereas the cession of territory is, in theory at least, always a voluntary act on the part of the ceding power. Thus, the acquisition of Porto Rico by the United States, as the result of the late war with Spain, was due to its conquest by the military and naval forces of the United States, while the acquisition of the Philippine Islands was disguised as a voluntary cession thereof by Spain. Indeed, it is usual for conquering nations in modern times to require as a condition of peace that the defeated nation shall recognize the title of the former to the conquered territory by a treaty of cession. The title is then, in legal theory, referred to the cession rather than to the act of conquest upon which it is really based.

Unless otherwise defined by treaty, the following rules govern the status of property and of the inhabitants of conquered territory: All public property passes to the conqueror absolutely. Except in the case of rebellion, private property rights remain undisturbed, and the conqueror is bound to make laws to insure the enjoyment of such rights, appropriate to the new political system imposed. Political laws and systems, being based upon reciprocal relations between citizens and the body politic, are destroyed, and, in the absence of treaty stipulations, political and civil rights of the inhabitants depend upon the provisions of the new régime. Absolute allegiance is due the conqueror. Municipal laws regulating the private relations of individuals are not abrogated, however, but continue in force by the implied acquiescence of the new sovereign, until superseded by new enactments. Consult Lawrence, *Principles of International Law* (London and New York, 1897), and also the authorities referred to under INTERNATIONAL LAW. See ALLEGIANCE; CESSION; CITIZEN; TITLE.

CONQUEST, IDA (1876–). An American actress, born in Boston. She made her début at the Tremont Theatre, Boston, in 1892, with Alexander Salvini, in a performance of *Rohan the Silent*. She is the daughter of a merchant of Boston, where she pursued her dramatic studies, and, when a child, played the part of Little Buttercup in *Pinafore* at the Boston Museum. She afterward appeared in *The Charity Ball* and *Americans Abroad*, under Daniel Frohman's management; *Liberty Hall* and *Under the Red Robe*, with the Empire Theatre Company, which she joined in 1895; *Too Much Johnson*, in which she played with the author, William Gillette, in London, and Gillette's *Because She Loved Him So*, produced in Boston in 1898. From 1901 to 1911 she appeared in many successful productions. Among the more notable are: *The Second in Command* (1901), *Ivan the Terrible* (1904), *Man and Superman* (1906), *Little Eyolf* (1910). Consult Strang, *Famous Actresses of the Day in America* (Boston, 1899).

CONQUEST OF GRANADA, grȧ-nä'dȧ, THE. 1. A tragedy by Dryden (1672), also called *Almanzor and Almahyde*. 2. A brilliant historical sketch by Washington Irving (1829).

CONQUEST OF MEXICO, THE. A noted historical work by W. H. Prescott (1843), containing the life of Hernando Cortés and an account of ancient Mexican civilization.

CONQUEST OF PERU, THE. An historical work by W. H. Prescott (1847), containing an account of the Incas and their civilization.

CONQUISTADORES, kôn-kês'tȧ-dō'rȧs (Sp., conquerors). A collective term for the Spanish conquerors of America, such as Cortés, Almagro, and Pizarro.

CON'RAD I (?–918). King of the Germans from 911 to 918. On the death of Louis the Child there was no Carolingian who had a legitimate claim to the throne in Germany. Consequently Conrad, who had some kinship with Arnulf, was elected. The sources for his election are few and conflicting, and consequently false statements about his origin have been readily accepted. Conrad favored and was supported by the Church, but could not command the obedience of the great dukes who were almost independent. He died Dec. 23, 918, and was buried at Fulda. On his deathbed he enjoined his brother to carry the royal insignia to his mortal enemy, Duke Henry of Saxony, with whom he had been continually at war since 912 A.D. Consult Stein, *Geschichte des Konigs Konrad I* (Nördlingen, 1872), and Dümmler, *Geschichte des ostfränkischen Reiches*, vol. iii (Leipzig, 1888).

CONRAD II (c.990–1039). King of the Germans and Roman Emperor from 1024 to 1039, known as the Salic. He was the grandson of Otto, Duke of Carinthia, and was elected King of the Germans in 1024, after the extinction of the Saxon Imperial line, becoming the founder of the Franconian dynasty. Immediately after his election he commenced a tour through Germany for the purpose of administering justice. In 1026 he crossed the Alps, chastised the

rebellious Italians, was crowned at Milan as King of Italy, and in the following year was anointed Emperor of the Romans by the Pope. He was soon recalled to Germany by the outbreak of formidable revolts, which he succeeded in suppressing. In 1032–34 he secured the Kingdom of Burgundy and added it to the Empire. In 1036 a rebellion in Italy again compelled him to cross the Alps; but his efforts to restore his authority were this time partially unsuccessful, and he was forced to grant various privileges to his Italian subjects. Shortly after his return he died, at Utrecht, June 4, 1039. Conrad was one of the most remarkable of the earlier monarchs of Germany. He repressed the power of the great feudal nobles and, by keeping the great duchies in his own family, strengthened the position of the crown. Consult Bresslau, *Jahrbücher des deutschen Reiches unter Konrad II* (Leipzig, 1879–84), and Pflugk-Harttung, *Untersuchungen zur Geschichte Kaiser Konrads II* (Stuttgart, 1890).

CONRAD III (1093–1152). King of the Germans from 1138 to 1152. He was the son of Frederick of Swabia and the founder of the Hohenstaufen (q.v.) dynasty. Conrad, with his elder brother, Frederick, supported Henry V against his enemies, and in return that monarch granted Conrad, in 1115, the investiture of the Duchy of Franconia. He subsequently (1128–35) contested the crown of Italy with the Emperor Lothair of Saxony, but without success. On the death of Lothair the princes of Germany, fearing the increasing preponderance of the Guelph party and attracted by Conrad's brilliant courage and noble character, offered him the crown, and he was accordingly elected at Aix-la-Chapelle, March 7, 1138. He was immediately involved in a quarrel with Henry the Proud, Duke of Bavaria and Saxony, and this was the origin of the conflict that continued for centuries between the Welfs, or Guelphs, the partisans of Duke Henry, and the Waiblings, or Ghibellines, the supporters of the Franconian house. (See GUELPHS AND GHIBELLINES.) In 1146 St. Bernard of Clairvaux began to preach a new crusade, and in the fall of 1147 Conrad set out for Palestine at the head of a large army (see CRUSADE), in company with his old enemy, Welf of Bavaria. He died Feb. 15, 1152. Consult Bernhardi, *Jahrbucher des deutschen Reiches unter Konrad III* (2 vols., Leipzig, 1883), and Jastrow, *Deutsche Geschichte im Zeitalter der Hohenstaufen*, vol. i (Berlin, 1893).

CONRAD IV (1228–54). King of the Germans from 1250 to 1254. He was the son of Frederick II and was born at Andria, in Apulia, April 26, 1228. He was elected King of the Romans in 1237, but was never crowned. Frederick II died in 1250, and Conrad and William of Holland contended for the Imperial throne. Unable to make head against the increasing anarchy in Germany, Conrad retired to Italy in 1251, and succeeded in reëstablishing the power of the Hohenstaufen in Naples in the face of the hostility of the papacy. He died of fever, May 21, 1254. Consult: Schirrmacher, *Die letzten Hohenstaufen* (Göttingen, 1871); Jordan, *Les origines de la domination angevine en Italie* (Paris, 1909); Winkelmann, *Kaiser Friedrich II* (2 vols., Leipzig, 1889–97).

CONRAD, kōn'rät, JOHANNES (1839–). A German political economist. He was born in West Prussia and was educated at Berlin and Jena. He became professor of political economy at Jena (1870) and Halle (1872), and took a prominent part in the proceedings of the second commission appointed to revise the civil code of Germany. In 1878 he became editor of the *Jahrbücher für Nationalökonomie und Statistik*, and associate editor of the *Handwörterbuch der Staatswissenschaften* (1889–95; 2d ed., 1898 et seq.). His works include: *Das Universitätsstudium in Deutschland während der letzten funfzig Jahre* (1884; Eng. trans. by Hutchison, with preface by James Bryce, 1885); *Grundriss zum Studium der politischen Oekonomie* (1896–1909); *Leitfaden zum Studium der Nationalokonomie* (1901).

CON'RAD, JOSEPH (1856–). An English novelist, the son of a Polish revolutionist. Known by his two first names, his real surname was Korzeniowski. He passed his youth in Poland. On the death of his father, Conrad, then only 13 years old, wandered to Marseilles, where he joined the French merchant navy and rose to be captain. Subsequently he became mate of an English ship. Though he did not learn English until comparatively late in life, he became the master of a style extraordinarily idiomatic and strong, and particularly notable for its descriptive resource. His successive books strengthened his reputation with exacting critics. Aside from their sheer narrative interest, his novels are vivid transcripts from seafaring life in the East, and skillfully note the changes effected in the Western character under Oriental influences. He has embodied his experiences in the Malay Archipelago and elsewhere in novels, fresh in subject and in style. They comprise: *Almayer's Folly* (1895); *An Outcast of the Islands* (1896); *The Nigger of the Narcissus*, published in the United States as *The Children of the Sea* (1897); *Tales of Unrest* (1898); *Lord Jim* (1900); *The Inheritors*, with F. M. Hueffer (1901); *Typhoon* (1902); *The Mirror of the Sea* (1906); *Point of Honor* (1908); *Chance* (1913); *'Twixt Land and Sea* (New York, 1913). Consult his volume of reminiscences, *A Personal Record* (1912), and R. Curle, *Joseph Conrad* (Garden City, 1914).

CONRAD, ROBERT TAYLOR (1810–58). An American judge and dramatist, born in Philadelphia, Pa. While a student he wrote *Conrad of Naples*. He wrote also for the press, and in 1832 began the *Daily Intelligencer*, which was soon merged in the Philadelphia *Gazette*. Failing health compelled his retirement from editorial work, and he became judge of the Court of Criminal Sessions, continuing until its dissolution, when he resumed his literary work and became editor of *Graham's Magazine* and associate editor of the *Philadelphia North American*. From this work he was called to be mayor of his city, and in 1856–57 was judge of the Court of Quarter Sessions. His *Aylmere, or the Bondman of Kent*, a drama, was played by Edwin Forrest. In 1852 this was published with other poems. He wrote also *Our Battles in Mexico* (1850).

CONRAD, TIMOTHY ABBOTT (1803–77). An American paleontologist, born in New Jersey. He was geologist in 1837 and paleontologist from 1838 to 1841 to the State of New York, and published a number of valuable works. His writings include: *American Marine Conchology* (1831); *Fossil Shells of the Tertiary Formations of the United States* (1832); *Monography of the Family Unionidæ of the United States*

(12 parts, 1835–59); *Check List of the Invertebrate Fossils of North America* (1866).

CONRÄDER, kŏn'rä-dĕr, GEORG (1838–1911). A German historical painter. He was born in Munich, studied under Foltz and Piloty at the academy there, and first attracted attention by his "Tilly in the Grave-Digger's Dwelling"; "On the Eve of Breitenfeld" (Kunst Halle, Hamburg), a spirited composition, showing the influence of Piloty. Other important works of his are: "The Destruction of Carthage" (Maximilianeum, Munich), "Hauer Painting Charlotte Corday in Prison," "The Death of the Emperor Joseph II," and two other large ceremonial pictures, containing many portraits, in the National Museum at Budapest.

CONRADIN (kŏn'rä-dēn') **OF SWABIA** (1252–68), King of Jerusalem and Sicily. The son of Conrad IV, and the last descendant of the Imperial house of Hohenstaufen (q.v.). At his father's death he was only two years old. Innocent IV immediately seized upon the young Prince's Italian possessions, on the plea that the son of a prince who died excommunicated had no hereditary rights; and other enemies of the house of Hohenstaufen were only too glad to follow the Pope's example. His uncle Manfred took up arms in his behalf, drove the papal forces from Naples and Sicily, and declared himself King till the young Prince came of age. This antagonism between the papacy and the Hohenstaufen induced Clement IV to offer the crown of the Two Sicilies to Charles of Anjou (q.v.). Charles immediately invaded Italy, and met his antagonists in the plain of Grandella, where the defeat and death of Manfred, in 1266, gave him undisturbed possession of the kingdom. The Neapolitans, however, detested their new master and sent deputies to Bavaria to invite Conradin, then in his fifteenth year, to come and assert his hereditary rights. Conradin accordingly made his appearance in Italy, and, being joined by the Neapolitans in large numbers, gained several victories over the French, but was finally defeated, and, together with his relative, Frederick of Baden, taken prisoner near Tagliacozzo, Aug. 23, 1268. The two unfortunate princes were executed in the market place of Naples, on October 29. His unfortunate fate and his poetical ability have made him prominent as a hero of drama. Consult Schirrmacher, *Die letzten Hohenstaufen* (Göttingen, 1871); Jordan, *Les origines de la domination angevine en Italie* (Paris, 1909); Hampe, *Geschichte Konradins von Hohenstaufen* (Innsbruck, 1894).

CONRART, kŏn'rär', VALENTIN (1603–75). A French writer, born in Paris. A careful student of modern languages, he became an authority on matters of style. He gathered about him a weekly circle of littérateurs, who read and discussed original works. In 1635, under the auspices of Richelieu, this company was organized by royal letters patent as the French Academy, of which Conrart became perpetual secretary. He wrote little—a few poems, letters, and brief *Mémoires* (edited 1825 by Monmerqué), besides compiling copious extracts from contemporary writers, and published almost nothing. Hence the well-known verse from the *First Epistle* of Boileau: "J'imite de Conrart le silence prudent." Consult Kerviler and Barthélemy, *Conrart, sa vie et sa correspondance* (Paris, 1881).

CONRIED, kŏn'rēd, HEINRICH (1855–1909). A theatrical manager. He was born in Bielitz (Austria), and received his education at the Realschule in Vienna. Beginning life as an actor, he soon undertook the management of various dramatic and operatic concerns. He came into prominence when he assumed the management of the Irving Place Theatre in New York. In 1903 he succeeded Maurice Grau (q.v.) as director of the Metropolitan Opera House. His first season was notable through the first production of *Parsifal* outside of Bayreuth, excepting an isolated production at Amsterdam in 1901. By Dec. 31, 1913, when the copyright of *Parsifal* expired, the work had been represented 43 times at the Metropolitan Opera House. For his advancement of art he was decorated by the emperors of Germany and Austria and the kings of Italy and Belgium.

CONRING, HERMANN (1606–81). A German physician, jurist, and miscellaneous writer, born at Norden, East Friesland. He studied at Helmstedt and Leyden, in 1632 was appointed professor of natural philosophy at Helmstedt, and in 1636 professor of medicine. He subsequently held the chair of politics. In 1664 he was granted a pension by Louis XIV of France, and in 1669 was appointed by the King of Denmark a Councilor of State. He was a determined opponent of alchemy and contended for the pharmaceutical value of chemistry and for Harvey's theory of the circulation of the blood. His *De Origine Juris Germanici* (1643) was the pioneer work on the history of German law; and his *Exercitationes de Republica Imperii Germanici* (1674) was an important contribution to the literature of the civil law. A six-volume edition of his works was prepared by Göbel, with a biography (Brunswick, 1730). Consult Stobbe, *Hermann Conring, der Begrunder der deutschen Rechtsgeschichte* (Berlin, 1870), and Goldschlag, *Beitrage zur politischen und publizistischen Tatigkeit H. Conrings* (Berlin, 1884).

CONSALVI, kŏn-säl'vē, ERCOLE, MARCHESE (1757–1824). A papal diplomatist and reformer of abuses in the Papal States. He became chamberlain to Pope Pius VI in 1783, and auditor of the Rota Romana in 1792, in which office he displayed great administrative ability. As secretary of the conclave at Venice, in 1799, he contributed mainly to the election of Pius VII, who in 1800 made him a cardinal and Secretary of State. In this capacity he concluded with great diplomatic skill the concordat with Napoleon in 1801; but having afterward incurred the displeasure of the Emperor by his stout resistance to the encroachments of France on the rights of his sovereign, Napoleon demanded his removal from office in 1806. After the Emperor's downfall the Pope sent him as his representative first to London, to meet the allied princes assembled there; then to the Congress at Vienna, where by his tact and moderation he succeeded in securing the restoration of the Papal States, the government of which he assumed as Secretary of State, continuing in office until 1823. His clever management of the relations to the European Powers resulted in the conclusion of concordats with most of them under conditions most favorable to the papal authority, and he made his domestic policy memorable by beneficial reforms and the suppression of abuses in various branches of administration. The sciences, literature, and especially the fine arts, are much indebted to his liberal patronage. For his *Life,* consult Crétineau-Joly, ed. by Drochon (Paris, 1895).

CONSANGUINITY (Lat. *consanguinitas*, from *consanguincus*, having the same blood, from *com-*, together + *sanguis*, blood). The relationship which subsists between persons who are of the same blood, i.e., who are descended from a common ancestor. It is either direct, which is the relationship between ascendants and descendants, or collateral, between persons who have a common ancestor but are in a different line of descent; as cousins, who have the same grandparents on either their fathers' or mothers' sides, but who are the issue of different children of those grandparents.

For legal purposes different degrees of consanguinity are established. Thus, in the direct line, a child is in the first degree from its parents, a grandchild in the second degree, and so on. In the collateral line degrees are established beginning with brothers and sisters and extending to the most distant collateral relatives. The method of computing degrees varies in different jurisdictions according as they follow the civil or canon law in this particular. By the civil law the degrees are separately numbered downward to each party, the common ancestor not being counted. Thus by this rule brothers would be in the second degree, uncle and nephew in the third, and so on.

By the canon law, where the parties are equally removed from the common ancestor, consanguinity is computed by the number of degrees between them and the common ancestor, and by this rule brothers would be in the first degrees and others correspondingly one degree less than under the civil law.

The question of consanguinity is important, and sometimes controlling, in determining a person's legal rights, qualifications, or disabilities, especially as to entering into certain relations with another or acting in certain capacities. Thus the law prohibits marriage between certain relations; judges and jurors and other officers are sometimes disqualified from serving in their particular capacities because of relationship with persons who may come before, or deal with, them in public matters; and consanguinity within the prohibited degree is the gravamen of the crime of incest. It is the controlling factor in the laws of inheritance and descent, which, although they vary somewhat in different jurisdictions, are always based on relationship; and blood relatives always take in preference to collaterals. See AFFINITY; COLLATERAL; MARRIAGE; SUCCESSION; HEIR.

CON'SCIENCE (Lat. *conscientia*, from *conscire*, to be conscious, from *com-*, together + *scire*, to know). A term that has been used to name various factors in moral experience. Thus the recognition and acceptance of a principle of conduct as binding is called "conscience." Again, the judgment of approval or disapproval of individual acts as right or wrong has been called "conscience." Still again, the satisfaction that follows action regarded as right, and the dissatisfaction and remorse resulting from wrong conduct, have been called "conscience." In earlier ethical theories conscience was regarded as a faculty, having moral jurisdiction, either absolute or as a representative of God in man's soul. See ETHICS; CASUISTRY.

CONSCIENCE, COURTS OF. English courts for the recovery of small debts, constituted by special local acts of Parliament in London, Westminster, and other trading districts. These courts were also called *courts of requests*. The first of these, the Court of Conscience for London, was created in the ninth year of Henry VIII, but others were subsequently established and their jurisdiction and procedure minutely regulated by Parliament. They were freely resorted to for the small cases within their jurisdiction, which was originally limited to 40s., but afterward extended to £5. With the reorganization of the county courts in 1888 (the County Courts Act, 51 and 52 Vict., c. 43) the courts of conscience lost their importance and were, with a few exceptions, abolished. See COURT.

CONSCIENCE, kôn'syăns', HENDRIK (1812–83). A Belgian novelist of French extraction, distinguished for his pictures of Flemish village life. He was born in Antwerp, Dec. 3, 1812, and was largely self-educated. He entered the army in 1830, left it in 1836, and in 1837 published his first novel in Flemish, *In the Wonderful Year 1566*, which won him great success, but left him in debt to his printer. His patriotic courage, which led him to use Flemish as a medium for literary expression, won him the distinction of being known as the pioneer and first great classic author of the literature of Flanders. Patronage secured him a post in a government office. He wrote *Phantasy* (1837), a collection of fantastic tales, and *The Lion of Flanders* (1838). Finding office work irksome, he abandoned it for gardening, which in turn he gave up for a sinecure at the Royal Academy of Painting. In 1845 he was appointed associate professor in the University of Ghent and instructor in Flemish to the royal children. In 1868 he was made custodian of the Wiertz Museum. These posts and others were rewards for unflagging efforts to revive and stimulate a literary interest in Flemish. He died in Brussels, Sept. 10, 1883. Among other well-known works of Conscience, most of which are translated into French and German and a few into English, are: *How One Becomes a Painter* (1843); *The Poor Nobleman* (1851); *The Good Luck to be Rich* (1855); *Duke Karl's Justice* (1876); *Benjamin of Flanders* (1880). His historical novels, written under the influence of Walter Scott, do not compare with his other works that give a very delicate and clean-cut portrayal of Flemish family life. The publication of his one hundredth volume in 1881 was the occasion for a national celebration throughout the Kingdom of Belgium, so popular was he among his countrymen. For his biography, consult Eeckhoud (Brussels, 1881) and Pol de Mont (Haarlem, 1883).

CONSCIENCE WHIGS. A name applied to those members of the Whig party in Massachusetts who in 1850 and thereafter refused to coöperate with those of their old associates—the so-called "Cotton Whigs"—who declared that the slavery question had been permanently settled by the Compromise of 1850. In New York the two factions were known respectively as the "Woolly Heads," or "Seward Whigs," and the "Silver Grays," or "Snuff Takers."

CON'SCIOUS LOVERS, THE. A comedy by Sir Richard Steele (1722), modeled upon Terence's *Andria*. This play was an attempt by Steele to purify the stage, and is referred to in Fielding's *Joseph Andrews* as the only fit play for a Christian to see.

CON'SCIOUSNESS. A term employed by psychology in two principal meanings. 1. In the first meaning it is the equivalent of "mental

endowment," or "the possession of mind." I am conscious of the objects and persons about me, of my own successes or shortcomings, of the validity of an argument or the beauty of a work of art, in the sense that I am mentally alive to these things, am capable of a mental reaction upon them, whether by way of mere perception or by way of critical estimate and appreciation. So, if I am sound asleep, or in stupor from a blow on the head or from the action of some drug, I am said to be "unconscious"; my mental life and reactions are in abeyance. This meaning, which would perhaps have lapsed from psychological usage were it not deeply rooted in the phraseology of philosophy and in popular parlance, must be carefully distinguished from the second and more technical meaning, according to which (2) consciousness is simply "present mind," "mind now," the total mental experience given at a particular time. "Consciousness," says Wundt, "does not mean anything that exists apart from mental processes; nor does it refer merely to the sum of these processes, without reference to their mode of interrelation. It expresses the general synthesis of mental processes, within which the single complexes are marked off as more intimate connections." It is "a comprehensive interconnection of simultaneous and successive mental processes." We may therefore define it as a cross section or temporal division of mind (q.v.); mind consists of a series of consciousnesses, more or less sharply differentiated. As we begin the day, we have the waking consciousness, followed by the getting-up consciousness, the breakfast consciousness, the work consciousness, etc., etc.

The separate complexes which enter into and compose a consciousness are termed the "contents of consciousness." Thus, the consciousness of a writer, at his desk, contains various psychological ideas, mostly in verbal form; the perceptions of sight and touch that are aroused by the act of writing; a general feeling of effort, etc. The question of the "range of consciousness," i.e., of the number of mental processes that a single consciousness can contain, has been approached experimentally and partly answered. It is found, e.g., that if an auditory consciousness be set up, by subjecting an observer (whose mind is otherwise unoccupied) to a continued series of metronome strokes, its range lies between the limits of 8 double impressions (16 strokes, rhythmically grouped in twos) and 5 eightfold impressions (40 strokes, rhythmically grouped in eights). In other words, a practiced observer can distinguish, without counting, between two successive series of 40 and of 39 strokes, if he be allowed to group by eights; whereas he cannot, however he may group them, distinguish between series of 41 and 42 strokes; these numbers exceed the maximal range of consciousness. The phrase "state of consciousness," formerly applied to mental processes like ideas, emotions, etc., now designates the mode of existence (clearness, prominence, obscurity, inhibition) of the contents of a particular consciousness; it is fully explained under ATTENTION (q.v.). Other phrases in general use are "field of consciousness" and "stream of consciousness"—the one formed after the analogy of the phrase "field of vision," the other emphasizing the essentially transient nature of conscious contents. Consult: Wundt, *Physiologische Psychologie* (1910); Titchener, *Text-Book of Psychology* (New York, 1910); James, *Principles of Psychology* (ib., 1890); Della Valle, *La psicogenesi della coscienza* (Milan, 1905). See SELF-CONSCIOUSNESS; UNITY OF CONSCIOUSNESS; EPISTEMOLOGY; PSYCHOLOGY; NOETIC CONSCIOUSNESS.

In modern philosophy consciousness first received attention from Descartes, who regarded it as the differentiating attribute of mind, which he defined as thinking substance. Spinoza classed it as one of the attributes of the one substance, the other known attribute being extension. Leibnitz ascribed it only to the more advanced monads (q.v.), the perceptions of the lower monads being unconscious. Kant elevated consciousness to the highest place among the synthetic principles which organize experience, calling it "the synthetic unity of apperception." The followers of Kant, including most recent idealists, treat it as a peculiar property of the "subject," the subject being the higher of the two terms which according to them are always distinguishable in experience; the other term is the "object." These two terms in their interrelation constitute what is technically known as the "subject-object relation." In the revolt against idealism within the last 15 years many thinkers, of whom William James is the best known, have discarded this view, and have substituted what has come to be called "the relational view of consciousness." According to James "pure experience," i.e., experience which is unreflective, is devoid of consciousness. In such experience things are not known; they simply "*are there*." But certain experiences appropriate prior experiences; and this appropriation constitutes the appropriated and the appropriating experiences into a "biographical continuum," i.e., into a self-conscious personality. This practically identifies consciousness with self-consciousness, and self-consciousness with memory. John Dewey agrees with James that in unreflecting experience there is no consciousness; for him consciousness (=awareness) is attention, and attention marks the interruption of the smoothly flowing experience by a problem: something goes wrong, and consciousness, or awareness, is the instrument which such an experience develops to rectify the trouble. There is no consciousness in naive unsophisticated perception. A view with quite a number of supporters, more or less influenced by Dewey, is that consciousness is a mode of organic behavior, capable of being observed from the outside just as well as any other mode of organic behavior. This is sometimes called "behaviorism." So far as it differs from Dewey's view, it ascribes consciousness to percipient organisms as well as to organisms that are intelligent; but in either case the consciousness ascribed is the behavior observed. Still other thinkers, accepting the view that consciousness is a relation among objects, have attempted to identify this relation in other ways than those adopted by James, Dewey, and the behaviorists. Thus, for Woodbridge consciousness is the objective relation of meaning obtaining among things; for McGilvary it is the relation which makes an experience out of objects; for Perry it is "behavior and those elements of the environment selected by the behavior"; for Montague it is the potential energy of the brain; for Pitkin it is a relation of projection. The preceding account will show that one of the moot problems of present-day philosophy is the nature

of consciousness. Most of the literature is in periodical form. Consult: James, *Essays in Radical Empiricism* (New York, 1912); Perry, *Present Philosophical Tendencies* (ib., 1912); Marvin and others, *The New Realism* (ib., 1912), and articles in recent volumes of the *Journal of Philosophy, Psychology, and Scientific Methods* by Montague, Woodbridge, Perry, McGilvary, Singer, and others.

CONSCIOUSNESS, UNITY OF. See UNITY OF CONSCIOUSNESS.

CON'SCRIPT FATHERS. A name given to the Roman senators after the expulsion of the Tarquins, when Brutus added 100 to the number of senators, the names of the newcomers being "written together" (*conscripta*) on the rolls with those of the original councilors. The proper designation was then *Patres et Conscripti*, afterward abridged to *Patres Conscripti*.

CONSCRIPTION (Lat. *con-*, together + *scribere*, to write). A compulsory enrollment or registration of men for service in the army and navy. Originally the word related to the selection, by lot, of a portion only of the male population qualified for military service. Later the word was used, as at present, to describe compulsory military service, whether partial or universal. The methods of raising men for the army have varied, from time to time and in the different states, with the exigencies and emergencies arising, and with the characteristic political and economic ideals of the people concerned. Athens employed a compulsory citizen militia which resembled in its effect the modern European system of universal service. The young men served two or three years continuously and then passed to a class of reservists subject to call when needed. Sparta went even further. Her male citizens of military age were not only compelled to serve, but to train themselves continuously in peace for service in war, the whole nation, in fact, living as a military garrison. The Roman system depended on the annual levy, consisting of four legions of infantry, two for each consul, each legion containing 6666 men. The consuls, who in the time of the Republic were always commanders of the army, would announce by herald or written proclamation that a levy was to be made. The proper conscription was as follows: *Milites cogere, colligere, scribere, conscribere.* The Swedish armies, 1630–32, under Gustavus Adolphus, were in part composed of national regiments raised on the *Indelta* system, under which each officer and man in a territorial district received a grant of land, each district supplying recruits in proportion to its population. It was, however, to France that we owe the modern principle of universal compulsory service. One of the earliest and most serious problems of the French Revolution was the question of an adequate supply of recruits. A limited compulsory system, supplemented by volunteer enlistment, was found inadequate and was replaced in 1792 by universal conscription, under which every man was liable for active service. This plan, however, included the serious defect of granting to communes and districts the privilege of selecting the men to fill the quota. As might have been anticipated, this resulted in the selection of the most undesirable citizens of the community. The means of enforcing the law were wanting. Various schemes were tried. So long as Napoleon's victories lent encouragement, recruiting was partially successful. After 1796, however, the citizens began to grow tired of the hardships of war, and there developed an ever-increasing opposition to the severity of the conscription laws. The economists regarded military service as a waste of productive energy. In order to meet this situation adequately the now famous conscription law of Jourdan became, in 1798, the law of the country and remained practically unaltered until 1870. This law, the basis of all continental systems, definitely asserted the right of the government to require every qualified citizen to serve in the army from his twentieth to his twenty-fifth year, leaving it to the government to determine what number should be called to the colors each year. Unfortunately an otherwise effective law was weakened by the privilege of exemption from service provided there was deposited a certain sum of money sufficient to secure a substitute. This latter principle led directly to the regular and repeated employment of an undesirable class of men and was one of the underlying causes of the disasters of 1870–71. The Prussian defeat by Napoleon at Jena in 1806 resulted in the introduction by Prussia of the *Krümper* system (from *Krümperpferde*, worn-out, condemned horses attached to mounted organizations for odd jobs; applied to recruits in jest). The regiments became training schools, through which recruits were quickly passed to the reserve. A large permanent army was prohibited by the Treaty of Peace after Jena. The system required universal service with few exemptions. For the first time in modern history there existed, in preparation for war, a systematic compulsory training in time of peace. The Krümper system, modified and improved, has been and is a controlling influence in the economic as well as in the military development of continental Europe. Since 1870, with the exception of Great Britain and the United States, all the Great Powers have adopted the principle of *compulsory* short service, reserves, and certain legal exemptions, e.g., the only son of a widow, certain officials of the government, etc. In the Republic of Switzerland there is universal service, but, in marked contrast to all other continental countries, there is no standing or permanent army. All males of military age, 20 to 48, serve; but as militia only, reporting for a few weeks each year for training and then returning to their civil pursuits. The modern plan of conscription includes the following: The male population is divided into classes, by ages, the total period of liability to service being about 25 years. At any given time, assuming two years' service with the regiment, the men of 20 and 21 years of age constitute the *active* army; those of 22 and 23 form the *reserve* for that army. These two classes form the *First Line.* The *Second Line*, called the *Landwehr*, consists of all men from 24 to 36 who have passed through the active army. The *Third Line*, called the *Landsturm*, consists of men who have also been in the active army, but are now between the ages of 36 and 44. In this system the state does not offer pay as an inducement, the pay being nominal, but does assert the principle that every citizen owes a military duty to his government and that this obligation includes training in peace for service in war.

The people of the United States have always been opposed to any system of conscription, and yet in the only two wars which threatened the existence of the government, the American Revolution and the Civil War, conscription was re-

sorted to despite all opposition. As early as 1777 the germ of this idea of compulsory service was embodied in a resolution of the Continental Congress. With its ineffective supervision of the States furnishing the militia quotas for the Continental Army, commanded by General Washington, Congress found it impossible to keep the ranks full by voluntary enlistments, and therefore recommended to the States, in a resolution dated April 14, 1777, that exempted persons be *compelled* to furnish a certain number of soldiers and be *compelled* to pay the additional bounties, etc. This use of paid substitutes introduced into the ranks the lowest class of mercenaries. Before the end of the year 1777 Massachusetts and Virginia set the example of *drafting* (conscription), and General Washington commended the measure to the Pennsylvania authorities as the only sure method of raising continental troops. In the following year, and with reference to the substitution feature of the draft, General Washington wrote as follows to the President of the Massachusetts Council: "It gives me inexpressible concern to have repeated information from the best authorities that the committees of the different towns and districts in your State hire deserters from General Burgoyne's army and employ them as substitutes to excuse the personal service of the inhabitants. I need not enlarge upon the danger of substituting as soldiers men who have given a glaring proof of a treacherous disposition, and who are bound to us by no motives of attachment, instead of citizens in whom the ties of country, kindred, and sometimes property are so many securities for their fidelity." Thus General Washington soon learned that in any prolonged war demanding the ultimate resources of a state, volunteering is inadequate and the substitution feature of conscription inadvisable, if not disastrous. Brevet Major General Emory Upton, United States army, in his notable work *The Military Policy of the United States*, written in 1880 (Washington Government Printing Office, 1912), submits the results of his analysis of the American Revolution in the following words: "It may be laid down as an axiom, based upon historical proof, that any government which foregoes its rights to compulsory military service becomes more and more enslaved by depending solely upon voluntary military service induced by gifts of money, land, and clothing. . . . That neither voluntary enlistments based on patriotism, nor the bounty, can be relied upon to supply men for the army during a prolonged war. . . . That the draft, connected or not connected with voluntary enlistments and bounties, is the only sure reliance of a government in time of war." The history of the Civil War (1861–65) also proved conclusively that in any great military undertaking the government could not rely upon volunteers alone to supply the wastage of war. In the Union army conscription was provided for by the Act of Congress known as the Enrollment Act, approved March 3, 1863, under which the President of the United States was authorized to call into active service quotas from each of the States of the Union. This act contained a clause popularly known as "The Rich Man's Exemption," under which any person drafted and notified to appear might furnish an acceptable substitute to take his place in the draft, or might pay, in lieu thereof, a sum not to exceed $300 for the procuring of such substitute. A person failing to comply with these regulations was deemed a deserter and could be arrested as such. The execution of the draft law created opposition in many communities. In the city of New York the enforcement of this law culminated in the notorious *Draft Riots* during the month of July, 1863, resulting in great loss of life and destruction of property. The riots lasted four days, and order was not permanently restored until the city was placed under martial law, supported by several regiments ordered from the field into the city. As early as 1862 the government had realized the failure of the volunteer system and had concluded that conscription, no matter how unpopular, was the only surely effective method of obtaining recruits. Unfortunately the principle of substitution and bounties was authorized and resulted, as always, in discrimination against the poor man and the admission of undesirables. After the riots President Lincoln, under date of Aug. 7, 1863, wrote as follows to Governor Seymour of New York: "We are contending with an enemy who, as I understand, drives every able-bodied man he can reach into his ranks, very much as a butcher drives bullocks into a slaughter pen. No time is wasted, no argument is used. This produces an army which will turn upon our now victorious soldiers already in the field, if they shall not be sustained by recruits as they should be. It produces an army not to be matched on our side if we waste time to reëxperiment with the volunteer system, already deemed by Congress, and palpably, in fact, so far exhausted as to be inadequate." The Confederate States Congress at an earlier date than the government of the United States recognized the failure of the voluntary feature of enlistment by passing a conscription law, April 16, 1862, the first section of which was as follows: "The Congress of the Confederate States of America do enact, that the President be, and he is hereby, authorized to call out and place in the military service of the Confederate States, for three years, unless the war shall have sooner ended, all white men who are residents of the Confederate States, between the ages of 18 and 35 years at the time the call or calls may be made, who are not legally exempted from military service."

In England in 1902 an agitation for universal compulsory service was started by the organization of the National Service League, of which Lord Roberts was elected president. (On compulsory service in England, consult *Fallacies and Facts* by Lord Roberts, 1911; and Sir Ian Hamilton's *Compulsory Service*, 1910.)

The United States army has no compulsory enlistment feature for the regular army, reserves, or militia. Although the whole body of male citizens between the ages of 18 and 45 years are declared by law to be *the militia*, only a small number of such citizens, called the *organized militia*, receives any military training whatever. The enlistment of these is purely voluntary. Recent laws have attempted to give the Federal War Department a more effective control over the organized State militia, but that control in any case can be lawfully exercised only within the continental limits of the United States and ceases in all cases with the expiration of the enlistment period. Thus, the United States regular army cannot be followed and supported by a second line of trained men, in any expedition beyond the borders of the United States, unless the hasty organization of untrained

civilians into volunteer regiments may be considered such.

Considering the economic influence of universal compulsory service as practically illustrated in the case of Germany, the highest exponent of that system, we find that for 43 years, since 1871, thanks to her military efficiency, she has preserved the peace with her neighbors and thus gained the opportunity to develop her industries. The German, for two years, undergoes the most rigorous military training, learns the habit of obedience to constituted authority, practices daily the latest theories of sanitation, is schooled mentally and exercised physically, and is then returned to his civil pursuits equipped for the serious business of making a living. The government utilizes his services in many of its departments. The police force of Berlin, said to be the best in the world, is composed entirely of army men. The sergeants of this force have the educational qualifications of a high school or minor college graduate in the United States. It has been estimated that on the average the trained German soldier's expectation of life is five years better than the normal of his own class in civil life. The German business man of to-day regards the army as a peace guaranty for the further extension of his commercial ventures. It should be remembered that Germany freely elects her Legislature by popular vote; that the compulsory military system has been in operation for over a century; that although there is, as in all questions of policy, a minority opposition, there has not yet been a majority vote against the existing military system. Therefore it must be concluded that the German people have retained their military guaranty of peace because they thought it both necessary and desirable.

CONSCRIT DE 1813, kōN'skrē' dẽ dēs wēt sĂN trâz, LE. An historical novel by Erckmann-Chatrian (1864).

CON'SECRA'TION (Lat. *consecratio*, from *consecrare*, to hallow, from *com-*, together + *sacrare*, to consecrate, from *sacer*, holy). The act of solemnly dedicating a person or thing to the service of God. It is one of the most widely spread of all religious ceremonies of the ancient world, having been practiced in Babylonia, Egypt, India, Judæa, Greece, Rome, Britain, and other countries. In the Old Testament we read of the consecration or dedication of the firstborn, both man and beast, to the Lord, also the dedication of the Levites, of the tabernacle and altar, of fields, houses, walls, etc. The custom of consecrating the places of public worship developed in the Christian Church as soon as persecution ceased, when, according to Eusebius, "the sight was afforded so eagerly desired and prayed for by all—the festivals of dedications and consecrations of the newly erected houses of prayer throughout the cities." Eusebius also describes the consecration of the church built at Jerusalem by Constantine in 335 A.D. The practice of consecrating religious edifices has continued in the Oriental, Roman, and Anglican churches. The forms, as found in the sacramentaries of Gelasius and St. Gregory, were at the first very simple, but they were gradually developed until, in the Roman Catholic church, the office of consecration became a long and impressive ceremony. It includes the placing in the altars of relics of the saints, the purification of the place with specially prepared holy water (called Gregorian Water because the formula for its benediction is first found in the sacramentary of St. Gregory), and the anointing of the church in 12 specified places with holy oil. (For the full form, consult the *Catholic Encyclopedia* under CONSECRATION.) The anniversary of this ceremony is kept as a festival of the first class. A church may not be consecrated until it is entirely free from debt; when the consecration is delayed, it is opened with a simple form of benediction. The ceremonies in the Eastern churches are as elaborate and not dissimilar. In the Church of England each bishop is left to his own discretion as to the form to be adopted, but that most generally used is the form sent down by the bishops to the Lower House of Convocation in 1712. The American prayer book provides a simple form of prayer, which retains the old ceremony of the bishop knocking for entrance at the door of the church. For the consecration of bishops, see BISHOP; ORDERS, HOLY; for that of the eucharistic elements, see MASS; LORD'S SUPPER.

CONSEC'UTIVES (Fr. *consécutif*, Sp., Portug., It. *consecutivo*, from Lat. *consequi*, to follow, from *com-*, together + *sequi*, Gk. ἕπεσθαι, *hepesthai*, Lith. *sekti*, Skt. *sac*, to follow, Goth. *saihwan*, Icel. *sjá*, AS. *sēon*, OHG. *sehan*, Ger. *sehen*, Eng. *see*). In music, the progressions of parallel fifths or octaves, which, according to the strict rules of harmony, are forbidden. See HARMONY, *Progression of Chords*.

CONSENT (OF. *consente*, from *consenter*, to *consent*, from Lat. *consentire*, to agree, from *com-*, together + *sentire*, to think). In law, the free will and assent of the mind of a competent person to some act or obligation affecting his legal rights or relations. The law prescribes under what conditions it is binding and when it is void or voidable. Thus, apparent consent obtained by fraud or coercion, or from an infant, or from an insane, intoxicated, or otherwise legally incompetent person, is deprived of all legal effect if such person chooses to avoid it. It is an essential element of contract and is of the greatest importance in certain cases in the law of crimes and torts, where the essence of the crime or wrong is that it was against the will of the person injured. One may legally consent to the infliction of a limited amount of bodily harm if there is no malice involved, as in friendly boxing or in football; but one cannot consent to the infliction of death or anything which will amount to a breach of the peace. See AGE; CONTRACT; CRIME; TORT.

CONSEN'TES DI'I (Lat. *consentes*, of uncertain etymology and meaning, probably from *com-*, together + **sens*, being, pres. p. of *esse*, to be, cf. Skt. *sant*, being, from *as*, to be; less probably for *consentiens*, from *consentire*, to agree). The 'co-existent gods,' the 12 chief Roman deities: Jupiter, Apollo, Mars, Neptune, Mercury, Vulcan, Juno, Vesta, Minerva, Ceres, Diana, and Venus. A colonnade in their honor, containing their statues, which stood at the northwest corner of the Forum, was restored as late as 376 A.D. Consult Hülsen-Carter, *The Roman Forum* (Rome, 1906).

CONSERVATION. The object of the conservation movement in the United States is to protect and develop the fullest usefulness of the great natural resources, which are the forests, the waters, the minerals, and the land. These are the chief bases, not only of material

well-being, but also of existence. Upon their conservation depends in the last analysis the growth, the continuity, and the efficiency of the nation.

The use of the natural resources of the United States has been accompanied by vast waste. In some stages of its history, and in many regions of its territory, waste of natural resources, particularly of the forests, has exceeded their beneficial use.

Owing to the work of the National Conservation Commission, appointed on June 8, 1908, by President Roosevelt, of which Gifford Pinchot was chairman and the late Dr. W J McGee his chief aid and adviser, the United States possesses the first inventory of natural resources to be made by any nation. This inventory, which was published in 1909 in the *Report of the National Conservation Commission* (Government Printing Office, Washington, D.C.), brought together all the information available from Federal, State, and private sources in order to take stock of the natural wealth still remaining in minerals, lands, forests, and waters. The more important features of this inventory may be summarized as follows:

INVENTORY OF NATURAL RESOURCES

Minerals. The annual mineral production of the United States exceeds $2,000,000,000 and supplies more than half the freight traffic of the country. The waste in extraction and treatment of mineral products is about $300,000,000 a year. It has available and easily accessible 1,400,000,000,000 tons of coal. The high-grade iron ores, which approximate 4,788,150,000 tons, will not last beyond the middle of the present century if consumption continues to increase at the present rate. The supply of the precious metals and of copper, lead, and zinc, silver, asphalt, quicksilver, and mica cannot be estimated closely, but is clearly exhaustible within one to three centuries, unless unexpected deposits be found. The known petroleum supply is 15,000,000,000 barrels, covering about 8900 square miles. Production increases rapidly, and loss through misuse is enormous. The supply cannot be expected to last beyond 50 years.

Enough natural gas, the most perfect known fuel, is wasted daily in the United States to supply every city of over 100,000 population. The consumption of nearly all the mineral products increases far faster than population. In 1776 less than 100 pounds of iron ore were in use by the average family. To-day the annual consumption per capita of high-grade iron ore is over 12,000 pounds. In 1812 the United States used no coal. Now it uses over five tons per capita, and the waste per capita is about three tons.

Lands. Two-fifths of continental America is in farms. Less than one-half the farm area is improved and made a source of crop production. The value of all the farms is nearly one-fourth the wealth of the United States. More than 10,000,000 people are engaged in agricultural pursuits.

The United States grows one-fifth of the world's wheat crop, three-fifths of its cotton crop, and four-fifths of its corn crop. Neither the increase in acreage nor the yield per acre of farm land has kept pace with the increase in population. Within a century it will probably have to feed three times as many people as now.

The average yield of wheat in the United States is less than 14 bushels per acre, in Germany it is 28 and in England 32 bushels. The United States gets about 30 bushels of oats per acre, England nearly 45, and Germany more than 47 bushels.

Agriculture in America has, on the whole, decreased soil fertility slightly instead of having increased it, as it has done in the older countries. The wild game and fur-bearing animals have been exterminated largely, and the same is generally true of the game birds.

Forests. Forests now cover about one-fourth of the United States. The original forests covered over one-third. Forestry, which means the conservation of the forests by wise use, is now practiced on 70 per cent of the forests publicly owned and on less than 1 per cent of the forests privately owned, or on only 18 per cent of the total forest area. Forests privately owned contain four-fifths of all standing timber in the United States.

The United States takes from the forests each year, not counting the loss by fire, three and one-half times their yearly growth. Forty cubic feet per acre are taken for each 12 cubic feet grown; and 260 cubic feet per capita are taken, while Germany takes 37 cubic feet, and France 25 cubic feet from their forests. Not less than 50,000,000 acres of forest is burned over every year, and forest fires destroy annually an average of 50 lives and $50,000,000 worth of timber. If the use and waste of the forest continues unchanged, all the mature timber now standing in the United States will be used up by 1965.

Waters. Less than 1 per cent of the rainfall, including snow, the sole source of the fresh-water supply, is retained and utilized for municipal and community supply; less than 2 per cent is used for irrigation. Perhaps 5 per cent is used for navigation and less than 5 per cent for power. About $500,000,000 is invested in water works and the appurtenant catchment areas for municipal and community supply. About $200,000,000 is invested in irrigation works, but few of the reservoirs are large enough to hold the storm waters. The waste of water in public and private irrigation projects exceed 60 per cent, while not more than 25 per cent of water available for the irrigation of arid lands is actually used.

In the continental United States there are 287 navigable streams, or an aggregate of 26,226 miles, and as much more navigable if they were improved. There are 45 canals, aggregating 2198 miles, besides numerous abandoned canals.

Water power now in use in the United States aggregates 10,000,000 horse power. The amount running over government dams and not used is about 1,400,000 horse power. The amount reasonably available, to quote the late Dr. W J McGee, "equals or exceeds the entire mechanical power now in use, or enough to turn every mill, drive every spindle, propel every train and boat, and light every city, town, and village in the country."

So much for the waste of natural resources up to now. What is the possibility of further waste and misappropriation of the natural resources still under public control, and constituting the national forests, the public domain, and

the navigable streams? This can be answered best by discussing the purposes of the conservation movement, the results already accomplished, and those still to be attained.

THE CONSERVATION MOVEMENT

The conservation movement sprang directly from the forest movement in the United States. The United States Forest Service developed in 10 years, under the leadership of Gifford Pinchot, from a minor division in the Department of Agriculture to an organization administering in the public interest nearly 200,000,000 acres of forest land, employing 3000 persons and aiding indispensably in the growth and development of the West. Gifford Pinchot was the first man to see that the use and the misuse of all the natural resources are interdependent, that conservation of these natural resources is essential to the national and individual welfare, and that this welfare is threatened by two great evils—by unnecessary waste and by unregulated and selfish monopoly.

As President Roosevelt often and freely stated, the conservation idea as applied to all natural resources came to him from Gifford Pinchot. It was at the suggestion of Gifford Pinchot that President Roosevelt called the Conference of Governors at the White House May 13–15, 1908, which ended in a declaration whose keynote was the recognition of the great natural resources as the material bases on which civilization depends and on which rests the prosperity of the nation; the expressed conviction that conservation of the natural resources should engage the attention of the people and the nation and the States in earnest coöperation; and the declared wish and intention to preserve these foundations of prosperity.

The Conference of Governors was followed by the appointment of conservation commissions in nearly all the States and by the appointment of similar commissions representing great organized industries. The conservation movement dates as an avowed and recognized public policy from that historic Conference of Governors.

The purpose of the conservation movement, broadly stated, is to develop the fullest permanent usefulness of the great natural resources. This calls, first, for thrift in their protection and utilization; it calls also for drawing a clear line, and maintaining it, between the privileges of the few and the rights of the many in acquiring natural resources necessary to the public welfare. Conservation therefore is not merely an economic but also a moral issue. It has been defined by Gifford Pinchot as "the application of common sense to common problems for the common good."

More specifically the purposes of the conservation movement are as follows. With respect to minerals the conservation movement aims: 1. So to use ores reduced to minerals as to confine to a minimum the loss by rust, electrolytic action, and other waste. 2. To make the pursuit of mining more safe to the miner. 3. To exercise such control through the national government of the mineral fuels and phosphate rocks still in its possession as to check waste and prolong our supply. 4. To meet and satisfy the need for further surveys and investigations and for further researches concerning the less-known minerals.

The policy of the conservation movement with respect to lands is as follows: 1. Every part of the public lands should be devoted to the use which will best subserve the interests of the whole people. 2. The classification of all public lands is necessary for their administration in the interest of the people. 3. The timber, the minerals, and the surface of the public lands should be disposed of separately. 4. Public lands more valuable for conserving water supply, timber, and natural beauties or wonders than for agriculture should be held for the use of the people from all except mineral entry. 5. Title to the surface of the remaining non-mineral public lands should be granted only to actual home makers. 6. Pending the transfer of title to the remaining public lands, they should be administered by the government, and their use should be allowed in a way to prevent or control waste and monopoly. 7. The public-land laws, as a whole, do not subserve the best interests of the nation. They should be modified so far as may be required to bring them into conformity with the foregoing outline of policy.

The conservation movement aims to perpetuate the usefulness of the forests by the following means: 1. To get practical forestry practiced on all private forest lands in the United States by whatever legitimate steps may be necessary to that end, including more adequate provision for State coöperation in fire protection, and tax laws modified so as to encourage rather than discourage the practice of forestry. 2. To maintain under Federal control the forest resources which are the property of the nation. 3. To encourage and educate all wood users, large and small, to reduce the drain on the forests by lengthening the life of timber used by preservation treatment and other obvious economies of wood in use. 4. To face and meet the national task in forest planting in the United States, in order to restore to productivity lands laid waste by destructive lumbering so far as those lands are suitable only for forest purposes.

With respect to the waters the conservation movement holds that the paramount use should be water supply; next should follow navigation in humid regions and irrigation in arid regions. The development of power in the navigable and source streams should be coördinated with the primary and secondary uses of the water. Other things equal, the development of power should be encouraged, not only to reduce the drain on other resources, but because properly designed reservoirs and power plants retard the run off and so aid in the control of the streams for navigation and other uses. Broad plans should be adopted providing for a system of waterway improvement extending to all uses of the waters and benefits to be derived from their control, including the clarification of the water and abatement of floods for the benefit of navigation, the extension of irrigation, the development and application of power, the prevention of soil wash; the purification of streams for water supply, and the drainage and utilization of the waters of swamp and overflow lands.

The policy of the conservation movement as regards water powers recognizes these three essentials of a sound water-power policy: prompt development; prevention of unregulated monopoly; good service and fair charges to the consumer. Water power is clearly a natural monopoly, since it can be controlled and used by but one concern at one time. Therefore it is directly upon the terms upon which the right

to use a water-power site is granted that the prevention of the monopoly of water power directly depends. One of the most striking features of the water-power situation to-day is concentration and control. Sixty-five per cent of all the developed water power in the United States is controlled by 10 groups of power interests, several of which are closely related by interlocking directorates between the groups themselves. Concentration and control have gone forward very rapidly in recent years and have nearly doubled in the last two years. The 10 great groups of interests hold about one-third more power undeveloped than they have developed. In the last two years control of undeveloped power has increased more than twice as fast as control of developed power by the same interests.

RESULTS ACCOMPLISHED

Since its inception these are the more important achievements of the conservation movement:

The successful administration in the public interest of the national forests, which contain nearly one-fifth of all the standing timber in the United States, and put each year vast quantities of mature timber to beneficial use, protect the headwaters of every important Western river, and help to support half the sheep and nearly one-tenth of the cattle on the Western ranges.

A second achievement of the conservation movement was the construction of a railroad in Alaska which will lead from the coast to the Matanuska coal fields. Railroad development by the nation was first suggested by Gifford Pinchot, who throughout has advocated the prompt and legitimate development of all the resources of Alaska with benefit to her citizens and the nation.

The third great achievement of the conservation movement was the progress made toward the application of the principles of range administration within the national forests to the whole public domain.

A fourth great achievement in conservation was the defeat of selfish attempts of the organized power interests, formerly successful at nearly every point, to get and hold in perpetuity and for nothing unregulated control of the water powers of navigable streams in the national forests and on the public domain.

Perhaps the most striking example of the extent to which the public conscience was aroused against water-power monopoly was the meeting of the National Conservation Congress, held in Washington Nov. 18, 19, and 20, 1913, at which a sharp difference arose between Gifford Pinchot, leading the minority of the water-power committee, and other men, constituting a majority of the committee, as to the declaration to be made by the congress on the subject of water power. Gifford Pinchot held that the congress should recognize unregulated monopoly of water power and go on record solemnly against it. His opponents held differently. The result was that the congress went on record against unregulated monopoly of water power in a clear and vigorous declaration.

Another victory gained by the conservation movement, but one in which all danger has not yet passed, was the fight to hold what conservation has already won. This fight centred around the national forests and all they contain, but it also involved the attempt to cede not only the national forests but the whole public domain to the Western States. In Congress 14 bills were introduced aimed in one way or another to turn over to the States natural resources now under Federal control. The policy of these bills was advocated openly and strongly by many members in Congress. None of them passed.

There are two great reasons why the national forests should not be turned over to the Western States. One reason is that such a step would involve waste of money and effort and would impair the usefulness of the national forests to the people. The other reason is that the States are not ready for this task. So far as they have performed a similar task in the past they have done it in the main incompetently or, what is much more serious, not with an eye single to the public interest.

Ownership or control of the national forests by the Western States would entail the creation of many forest services instead of one. Few States have more than the mere beginnings of an efficient forest organization, and still fewer have an adequate machinery for getting and retaining, regardless of political considerations, efficient men for the work. But, beyond all that, is the fact that these national forests are a national resource on which depends the prosperity not of any one section or part of the people or of the country, but of the whole people and of the whole country. To develop their fullest usefulness to the whole people and to the whole country calls for their administration under national policies from the national point of view.

With regard to its political significance, the conservation movement is not in any sense a movement of any one party.

RESULTS TO BE ACCOMPLISHED

The conservation movement faces the necessity for further achievements before the natural resources are safe either from unregulated monopoly or from waste. These are as follows:

The passage of legislation for the development of the water powers of the national forests and the public domain and of interstate and navigable streams on terms fair to the people and to the power interests.

With respect to Alaska, the citizens of Alaska should be enabled to get coal promptly and easily for domestic use, and through railroad development by the government and through provision for the working of coal mines on a larger scale under lease, the utilization of this vast natural resource should be encouraged with benefit to the people.

The grazing lands of the public domain cover about one-sixth of the United States and produce most of our beef and mutton, leather and wool. Through wasteful use these lands have been so injured for grazing purposes that they feed only about one-half the stock which they would feed were their use wisely regulated. The improvement of the public range by regulated use is an essential and exceedingly important step in the reduction of the cost of living.

The needless pollution of streams is an increasing menace to health and in some instances to life itself. The pollution of the waters of any navigable stream or interstate stream or lake should be deemed an offense against the public, and subject to penalties adequate in amount to prevent its repetition.

CON'SERVA'TION OF ENERGY, PRINCIPLE OF. See MECHANICS; ENERGETICS.

CONSERVATION OF MATTER. See MATTER, *Properties of Matter.*

CONSERVATION OF WILD LIFE. See WILD LIFE, CONSERVATION OF.

CONSER'VATIVE. See WHIG; TORY; POLITICAL PARTIES, *Great Britain.*

CONSERVATIVE CLUB, THE. A Tory club founded in London in 1840. Its clubhouse is in St. James's Street.

CON'SERVA'TOR OF THE PEACE. An ancient office of great dignity and authority in England. It existed at common law as an incident of certain tenures of lands held immediately of the King; or the King might appoint one to be his warden or the conservator of his peace; and before the institution of justices of the peace certain officers were so appointed. Now the only official conservators of the peace are certain officers who hold this power annexed to the offices which they hold. The sovereign, by virture of his office, is the principal conservator of the peace in British realms. Several high officers of the crown, the Chancellor or Lord Keeper, the Lord High Steward, the Lord Marshal, and the Lord High Constable, when there are such officers, and all the justices of the High Court, are conservators of the peace throughout the whole kingdom and may commit breakers of the peace or bind them in cognizances anywhere. Other judges possess this power only within the limits of their own jurisdiction. The sheriff and coroner are conservators of the peace within their respective counties, and constables, tithingmen, etc., within their jurisdictions. The phrase is not in use in the United States. Consult Stephen, *Commentaries on the Laws of England* (13th ed., London, 1899).

CONSER'VATORY (ML. *conservatorium*, place for preserving anything, from Lat. *conservare*, to preserve, from *con-*, together + *servare*, to keep, Ar. *har*, to preserve). A school for the cultivation of music in all its branches. Besides strictly musical subjects, stage deportment and the modern languages used in singing (German, French, Italian) are usually included in the curriculum. Originally, however, a conservatory was not a school of music, but an orphan asylum or institution of a benevolent character for the care of children of the poor. Such children as showed a talent for music were educated in the art. At first this instruction was given to the inmates only, but subsequently day scholars also were admitted upon payment of a moderate fee. The oldest conservatory is the Conservatorio Santa Maria di Loreto in Naples, founded in 1537. Within the same century three more conservatories were established in the same city. By order of King Murat these were consolidated, in 1808, under the name Collegio Reale di Musica. Venice had four such institutions, which ceased to exist with the downfall of the Venetian Republic. To-day the Conservatory of Venice is known as the Liceo Benedetto Marcello. The success of these schools was so pronounced that soon conservatories were founded all over Italy. Among the best known are (1) the Regio Conservatorio di Musica, in Palermo, founded 1615; (2) the Liceo Musicale, in Bologna, founded 1804, noted for its magnificent library, the greater part of which was bequeathed to it by Padre Martini and Gaetano Gaspari; (3) the Regio Conservatorio di Musica, in Milan, founded 1807; (4) the Civico Istituto di Musica, in Genoa, founded 1829; (5) the Liceo Musicale, in Turin, founded 1865; (6) the Liceo Musicale Rossini, in Pesaro, established in 1882 by a gift of 2,300,000 lire from Rossini.

In France the necessity of a school for the education of singers led to the establishment, in 1784, of the Ecole Royale de Chant et de Déclamation. During the French Revolution, in 1793, owing to the scarcity of instrumental performers for the army, the course was extended, and the name was then changed to Institut National de Musique. In 1795 it was reorganized and has since been known as the Conservatoire de Musique. To-day it is beyond all question the most famous music school in the world. Prizes are awarded in all the classes. The highest honor conferred is the Grand Prix de Rome, which entitles the winner to a three years' stay in Italy with a single condition, that the holder send from time to time original compositions as evidence of his progress. Nearly all the famous French composers of the last century have been winners of this prize. (See PRIX DE ROME.) There is scarcely a musician of note in France who has not been at some time a professor in the conservatory. The directors since its foundation have been Sarette (the founder, 1784–1814); Perne (1814–22); Cherubini (1822–42); Auber (1842–71); A. Thomas (1871–96); Dubois (1896–1905); Fauré (1905–). One of the foremost of French institutions is the Schola Cantorum, established in 1896 by D'Indy, Bordes, and Guilmant. Originally intended as a training school for liturgical music, it soon expanded into a regular conservatory, espousing the cause of ultra-modern French music. D'Indy has been its director since its foundation.

The oldest among the German conservatories is that of Prague, founded 1811, which, in addition to the usual musical courses, offers also a liberal-culture course. The Vienna Conservatory was opened in 1817 by Salieri as a school for singing. It became a true conservatory in 1821. The most famous conservatory in Germany is that in Leipzig, founded by Mendelssohn and Schumann in 1843. Among its professors have been M. Hauptmann, L. Plaidy, E. F. Richter, Hiller, Gade, Moscheles, Reinecke, and Brendel. Among its pupils were Grieg, Sir A. Sullivan, Svendsen, Wilhelmj, Kirchner, Jadassohn. The oldest Berlin conservatory was founded in 1850 by Kullak, Marx, and Stern. Among its professors were Bülow, Kiel, De Ahna, B. Scholz. The Neue Akademie der Tonkunst (chiefly for piano) was opened in 1855 by Kullak. The most important of the Berlin conservatories is the Königliche Hochschule für Musik, a branch of the Royal Academy of Arts. It is divided into three parts: (1) Königliches Institut für Kirchenmusik; (2) Abteilung für musikalische Komposition; (3) Abteilung für ausübende Tonkunst. Among the professors have been Joachim, Ph. Spitta, Bargiel, Herzogenberg. The Conservatory of Cologne was founded in 1850 by Hiller. The Dresden Conservatory was founded 1856, and that of Stuttgart in the same year. The famous Königliche Musikschule in Munich, founded 1867, offers, besides the musical, liberal-culture courses. Among the other famous German conservatories of to-day are those in Würzburg, Frankfort, Hamburg, Breslau, Strassburg, Karlsruhe, Regensburg (church music). Besides these public or state conservatories there are

also a number of not less famous private conservatories, such as those of Scharwenka, Schwanzer, Klindworth, Freudenberg. Switzerland also boasts some efficient conservatories in Geneva, Zurich, Basel, Bern. One of the greatest and best-known conservatories is that in Brussels, founded 1813, among the directors of which were Fétis and Gevaert. The conservatories in Liège and Ghent are also famous. In Antwerp Peter Benoit founded, in 1867, entirely after German models, the well-known Vlaamsche Muziekschool. Nor is Holland behind in the efficiency of her conservatories. The Maatschappij tot bevordering van tonkunst was opened in 1862 at Amsterdam. Also the conservatories in Rotterdam and The Hague have risen to importance. The oldest conservatory in Russia is that of Warsaw, founded 1821; the most famous, that in St. Petersburg, established 1862. Among its professors were Zaremba, Anton Rubinstein, Leschetitzky, Wieniawski, Davidoff, and Tschaikowski. A conservatory was also founded in Moscow in 1864 by Nicholas Rubinstein.

In England we find five conservatories in London—the Royal Academy of Music (1822); the London Academy of Music (1861); the Trinity College Conservatory (1872); the Guildhall School of Music (1880). The best of all is the Royal College of Music, established originally by Sir Arthur Sullivan as the National Training School of Music (1876). Sir George Grove was the first director under the reorganized administration (1883–94). He was succeeded (1894) by C. H. Parry. All other European countries have now conservatories of more or less importance.

In the United States music has made enormous strides within the last quarter of a century, and conservatories have been founded in nearly all the larger cities. Among the best known are the Chicago College of Music (1867), the Peabody Conservatory in Baltimore (1871), the Cincinnati College of Music (1878), the New England Conservatory of Music in Boston (1882), the National Conservatory of Music of America in New York (1885), the Guilmant Organ School in New York (1898). Perhaps the most richly endowed of all is the Institute of Musical Art in New York (1905). Besides, some of the great American universities have added a complete course of music to their regular curriculum, as Harvard (W. R. Spalding), Yale (Horatio W. Parker), Columbia (C. Rübner), University of Pennsylvania (A. A. Clarke), University of Michigan (A. A. Stanley).

CONSERVATORY. In horticulture, a glass house used for the preservation of tender exotics and the display, rather than the propagation or growing, of plants which have been brought to their ornamental perfection in a greenhouse. The term is often applied loosely to any ornamental greenhouse. See GREENHOUSE.

CON'SHOHOCK'EN. A borough in Montgomery Co., Pa., 13 miles northwest of Philadelphia; on the Pennsylvania and the Philadelphia and Reading railroads, and on the Schuylkill River (Map: Pennsylvania, L 7). The more important industrial establishments include rolling mills, steel mills, foundries, furnaces, surgical-implement works, rubber works, and cotton and woolen mills, the principal products of which form the basis of extensive trade. Conshohocken was founded in 1830 and was incorporated as a borough in 1852. Pop., 1890, 5470; 1900, 5762; 1910, 7480.

CONSIDÉRANT, kŏn'sē'dā'răn', VICTOR PROSPER (1808–93). A French socialist, born at Salins, in the Department of Jura. After being educated at the Ecole Polytechnique in Paris, he entered the army, which, however, he left, after attaining the rank of captain of artillery, in order to promulgate the doctrines of Fourier. After the death of his master Considérant became the head of the Societarians, or Fourieristic sect, and undertook the management of their organ, the *Phalange*. Having gained the financial support of a young Englishman, Mr. Young, he established (1832) on a large scale, in the Department of Eure-et-Loir, a Socialist colony, or *phalanstère;* but the experiment failed, and with it the *Phalange* went out of existence. In 1843 Considérant founded a new organ of cooperative doctrine, the *Démocratie pacifique*, and conducted it with great zeal, perseverance, and ability. In 1848–49 he was a member of the Constituent Assembly, but was accused of high treason and compelled to flee to Belgium. In 1852 he visited America and associated himself with Albert Brisbane and other leaders of the Fourieristic movement in America. He traveled to the Mississippi valley, in search of cheap land upon which to found a great colony. He fixed upon a tract of land in Texas, near the Red River, and, returning to Belgium, procured from Godin (q.v.) a capital of 100,000 francs with which to launch his project. In 1854 he returned to America with 200 colonists, with whom he inaugurated his colony under the name of La Réunion. The colony proved a failure, and in 1869, deserted by all his followers, Considérant returned to France. The work by which he is best known is his *Destinée sociale* (1834–45), which is, however, little more than a summary of the doctrines of Fourier. His most original work is his *Socialisme devant le vieux monde* (1849). In spite of his Socialism Considérant was a conservative in religion and an enemy of revolution. See FOURIER; FOURIERISM.

CONSIDERATION (Lat. *consideratio*, from *considerare*, to observe, from *com-*, together + *sidus*, star). In the law of contracts, a detriment or the surrender of a right by one party in exchange for the promise of the other party. In case of a bilateral contract, i.e., one in which the promises are mutual, each promise is a consideration for the other. A consideration is essential to a valid simple contract. A mere promise made without a consideration is called by lawyers a naked promise (*nudum pactum*), and on it suit will not lie. Such a promise, even though made in writing, is not a valid legal contract. The requirement of consideration as a necessary element in a simple contract is due to the historical development of the contract action of assumpsit (q.v.) as an action in tort. In that action the plaintiff was required to show that he had given up a right or suffered some detriment in reliance upon, or in exchange for, the defendant's promise, by reason of which he had been damaged. Thus, a consideration need not be in the form of a direct benefit to the contracting party, but may be something involving loss or prejudice to the second party to the contract. On the other hand, a promise to reward another for performing his legal duty cannot be enforced, since the performance of a legal duty is not the surrender of a right or any detriment in a legal sense. Thus, the promise of a debtor to pay his debt is not a consideration for a contract, as the promisor is already under a legal obligation to pay his debt. If,

however, the promise is made after the debt is barred by the statute of limitations, the promise has the effect of reviving the obligation and may be sued upon although no consideration is given for it. This is anomalous. The law takes no account of the adequacy of consideration if the contract is made in good faith; but if inadequacy results from fraud or mistake, the contract may be rendered void or voidable according to the circumstances of the case. If the consideration given is contrary to public policy, or is a promise to do an illegal act, the contract based theron is illegal and void. See CONTRACT; MISTAKE; FRAUD.

CONSIGNMENT (from Fr. *consigner*, to consign, from Lat. *consignare*, to seal, from *com-*, together + *signare*, to sign, from *signum*, sign). In mercantile law, a quantity of goods delivered by one party, called the consignor, to another, called the consignee, for custody, for transportation, for sale, or pursuant to a contract for their sale. When they are delivered to a common carrier for transportation, the consignment is generally evidenced by a *bill of lading* (q.v.). See BAILMENT; CARRIER, COMMON; FACTOR.

CONSIS'TORY (Lat. *consistorium*, from *consistere*, to stand together, from *com-*, together + *sistere*, to station, from *stare*, to stand). Properly a place of assembly, but in later Latin the word came to mean a particular place where the Council of the Roman Emperor met, and, after the time of Diocletian and Constantine, the Council itself, which became the supreme judicial tribunal of the later Roman Empire. Up to the time of Marcus Aurelius, the Roman Emperor frequently exercised in person the supreme judicial authority, which covered matters brought directly before him for decision, as well as appeals from the judgments of the provincial prætors in all parts of the Empire. In the troublous times which succeeded, this function was devolved upon a council, made up largely of jurists, which acted in his name, and whose judgments were of equal authority with statutes immediately promulgated by him. These judgments of the consistory were known as decrees (*decreta*) and formed an important part of the Imperial legislation (*constitutiones*) of the later Empire. In the membership of this Council were the Imperial officials, and its function was to deliberate on the important affairs of legislation, administration, and justice. The *form* of the Imperial consistory passed over into the early Christian Church. The bishops established their consistories, and the name was applied to the assemblies of the Roman clergy and the bishops of the suburban sees, out of which the College of Cardinals has developed. Public consistories are now held in the Vatican for formal functions, such as the giving of the hat to a cardinal, the final pleadings on the question of canonization, or the reception of an ambassador. Secret or ordinary consistories, to which none but cardinals have access, discuss a variety of administrative matters, such as the erection of new sees and the nomination of cardinals and bishops. The detailed work, however, is done in the committees, which are known as "consistorial congregations." (See CONGREGATION.) Semipublic or extraordinary consistories contain bishops in addition to the cardinals, and take a final vote on proposed canonizations. In the Greek church each bishop has his own consistory of three to seven members nominated by him and confirmed by the Holy Governing Synod. An appeal lies from the consistory to the bishop and from the bishop to the synod.

In English ecclesiastical law, the consistory, or consistorial court, is the tribunal in which the bishop exercises his ordinary legal jurisdiction. This jurisdiction was formerly very extensive, including the trial for common-law offenses of clerks, or persons entitled to claim exemption from the process of the secular tribunals (see BENEFIT OF CLERGY), and to a very recent date the cognizance of all matrimonial causes, the probate of wills, the administration of decedents' estates, etc. The reform of the judicial procedure in England in 1857 transferred the latter classes of cases to the jurisdiction of the ordinary tribunals, leaving to the consistorial courts only their more strictly ecclesiastical jurisdiction. In general, an appeal lies from the judgment of the consistory court to that of the archbishop—the Court of Arches (of Canterbury)—or the Chancery Court of York. The presiding officer of the consistory is the chancellor of the diocese, his judicial title being variously the ordinary, the official principal, and vicar general. See those titles; also ECCLESIASTICAL COURTS; CANON LAW; and consult Phillimore, *Ecclesiastical Law of the Church of England* (2d ed., London, 1895).

In the Lutheran state churches the consistory is a board of clerical officers either national or provincial, usually appointed by the sovereign and charged with various matters of ecclesiastical administration. These bodies exercise a supervision and discipline over the religion and education of the people, as well as over the clergy and the schoolmasters, and examine the candidates for the ministry for license and ordination. They have also the regulation of public worship and the administration of church property. In the Protestant churches of France the consistory exercises a more restricted jurisdiction than in Germany. In the Reformed (Dutch) church the consistory is the lowest ecclesiastical court, having charge of the government of the local church and corresponding to the session of a Presbyterian church.

CONSOLACIÓN DEL SUR, kōn'sō-lä'thē-ōn' dĕl sōōr (Sp., Consolation of the South). A town in the Province of Pinar del Río, Cuba, about 15 miles northeast of Pinar del Río (Map: Cuba, B 4). It is in the midst of the Vuelta Abajo District, one of the most famous in Cuba for fine tobacco. Pop., 1899, 3062; 1907, 3414.

CONSOLATO DEL MARE, kōn'sō-lä'tō dĕl mä'rā (Consulate of the Sea). A code of maritime law, compiled, it is believed, at Barcelona in the fourteenth century and made up of the settled usages, as to trade and navigation, of the maritime communities of the Mediterranean. The earliest copy known was published at Barcelona, in 1494, in the Catalan language. It contains (1) a code of procedure issued by the kings of Aragon for the guidance of the courts of the consuls of the sea; (2) a collection of ancient customs of the sea; and (3) a body of ordinances for the government of cruisers of war. It enjoyed considerable authority and has passed, by legislation and by judicial adoption, into the maritime law of Europe and America. Its provisions were largely embodied in the French Maritime Code of 1681 (*Ordonnance sur la marine*). The code was translated into Italian and printed in Venice in 1549, and French, Dutch, German, and English translations have also been made. The most valuable

portion, the customs of the sea, will be found printed in English in the appendix to the *Black Book of the Admiralty* (London, 1874). Consult: Robinson, *Collectanea Maritima* (London, 1801); Pardessus, *Collection des lois maritimes antérieures au 18ème siècle* (Paris, 1828–45); Reddie, *Researches, Historical and Critical, in Maritime International Law* (Edinburgh, 1844–45); Wheaton, *History of the Law of Nations in Europe and America* (New York, 1845); Schaube, *Das Konsulat des Meeres in Pisa* (Leipzig, 1888); Valroger, *Etude sur l'institution des consuls de la mer au moyen-âge* (Paris, 1891).

CONSOLE, kŏn'sōl (Fr., probably ultimately from Lat. *consolidare,* to strengthen, from *com-,* together + *solidus,* firm). In architecture, a projection in the form of a letter S or of a single or double scroll, used to support cornices, or sometimes busts, vases, figures, etc. Consoles are often richly ornamented and are, in fact, sometimes purely decorative features, differing in this from brackets (q.v.) and corbels (q.v.), which have a structural function. The name is also applied to a table fixed against a wall, the front carried on curved supports instead of straight legs.

CONSOLIDATION (Lat. *consolidatio,* from *consolidare,* to strengthen) **ACTS.** Statutes which combine in a single act all previous statutes relating to, and coming under, the same general subject matter. As a general rule, this cannot be done by a mere collocation, or gathering together under one head, of acts of different dates in their original form; but they must be rewritten, arranged in sections, all inconsistencies and surplusage be omitted, and uniformity of expression obtained, so that the whole may be a complete and logical act. Frequently, in order to do this, amendments to many of the measures which it is proposed to bring together are passed, and then they are reënacted by the consolidation act. The meanings of various technical terms in the statutes are usually defined and explained in a sort of prefix, which is made a part of the whole and is thus binding on the courts. The acts which are consolidated, and thereby superseded, are repealed by an express provision in the same measure. Consolidation measures have proved successful in England in rendering their statute law more simple and concise. Several of the United States have followed the idea, but generally have gone further, and enacted all the existing law on a given subject, whether contained in statutes or decisions, and the result is more in the nature of a codification act than a consolidation act as known in England. See CODE; REVISED STATUTES.

CONSOLS'. A contraction of the words "consolidated annuities." In incurring the English debt, the government borrowed money at different periods on special conditions, generally the payment of an annuity of so many per cent on the sum borrowed. Great confusion arising from the variety of stocks thus created, it was thought expedient to strike an average of their value and consolidate them into one fund, kept in one account at the Bank of England. The Consolidated Annuities Act was passed in 1757.

CON'SONANCE (Lat. *consonantia,* from *consonare,* to sound together, from *com-,* together + *sonare,* to sound, from *sonus,* Skt. *svana,* sound, from *svan,* to resound), or CONCORD. In music, the simultaneous sounding of two or more tones belonging to the same major or minor triad. The effect upon the ear is entirely satisfying, so that further progression or resolution is not required, as it is in the case of dissonance (q.v.). This feeling of rest is attributed to the simple ratios existing between the number of vibrations of consonant intervals, whereas the ratios between dissonant intervals are complex. Consonant intervals are the unison, perfect fourth, fifth, and octave, as well as major and minor thirds and sixths. (See INTERVAL.) Chords formed by only consonant intervals are consonant chords. They are of two kinds, major and minor triads; the major triad consisting of tonic, major third, and perfect fifth, the minor composed of tonic, minor third, and perfect fifth. See ACOUSTICS; CHORD; HARMONY; TRIAD.

CON'SONANT. See LETTERS; ALPHABET.

CON'SORT (Lat. *consors,* partner, from *com-,* together + *sors,* lot; probably connected with Lat. *serere,* Gk. *εἴρειν, eirein,* Skt. *si,* to join together). A term applied to the husband or wife of a reigning sovereign, viewed in a public capacity. Whatever political influence may attach to the position, the probability that the consort will attempt to secure some share in the royal prerogative is naturally greater where the consort is the husband; and as the royal spouse is most frequently a foreigner, national legislatures have always been careful to restrict his activity to the ornamental functions of royalty. In some cases, however, the husbands of ruling sovereigns have been granted a share in the government, a notable instance being that of Ferdinand of Aragon, who on his marriage to Isabella of Castile was declared joint ruler of that country. Prince Consort was the official title of Prince Albert Saxe-Coburg-Gotha after his marriage to Queen Victoria of England.

CONSPIRACY (OF. *conspiracie, conspiratie,* from Lat. *conspirare,* to conspire, from *com-,* together + *spirare,* to breathe). As a criminal offense this has been judicially defined as "a combination by two or more persons, by some concerted action, to accomplish an unlawful purpose, or to accomplish a purpose not in itself unlawful, by unlawful means." It will be observed that the gist of the offense is the agreement or confederation of the conspirators; an overt act pursuant to the agreement is not necessary to the completion of the crime, although, in most cases of conspiracy, such acts are performed. This doctrine of the common law has been changed by Federal legislation and by statute in many of the United States. Under such legislation the commission of an overt act to effect the object of the conspiracy is essential to consummate the crime; but as soon as that act is done the offense of conspiracy is complete and is not in any way affected by the nature or results of the act, even though the act be such that it could not possibly accomplish the conspirator's intention.

When a conspiracy has been entered into, the conspirators become so related legally that the acts or statements of any of them in reference to the common purpose are admissible against all—each is the authorized agent of all. This rule often induces the public prosecutor to have persons indicted for a conspiracy, even when their confederation has resulted in the commission of other crimes, such as treason or murder.

Some of the more important common-law conspiracies were those to commit treason or sedition, to murder, to cheat and defraud, and to maliciously injure another. They were mis-

demeanors only. Statutory conspiracies, i.e., acts declared by legislation to be punishable as conspiracies, have been raised to the rank of felonies in some instances.

Whether conspiracy is a civil wrong of itself is a question upon which judges and writers differ. There is eminent authority for the view that it is a distinct tort—an actionable wrong, without respect to the consequences of the acts done pursuant to the confederation. The prevailing view at present, however, both in England and in the United States, is that the gist of the civil cause of action is the actual damage done to the plaintiff, not the agreement or confederation against him.

Consult: Wright, *Law of Criminal Conspiracies* (London, 1873; Philadelphia, 1887); Bishop, *New Commentaries on the Criminal Law* (Boston, 1900); id., *Commentaries on the Non-Contract Law* (Chicago, 1889); also *Encyclopædia of the Laws of England* (2d ed., London, 1907).

CONSTABLE, kŭn'stȧ-b'l (OF. *conestable*, Fr. *connétable*, from ML. *conestabulus, comestabulus, comistabuli*, constable, from Lat. *comes stabuli*, count of the stable). 1. An officer of great dignity and authority in the Eastern Roman Empire, whence the office passed, with varying functions but no loss of authority, to the Western nations of Europe. The Constable of France, as commander in chief of the army and navy and chief arbitrator in chivalry, became the most powerful officer and dignitary in the state after the King, and because of the danger to the crown that lurked in its greatness, the office was abolished by Richelieu in 1627. The dignity was revived by Napoleon Bonaparte, but again abolished after the restoration of the monarchy. Across the Channel the office existed with similar functions, under the title of Lord High Constable of England, but it never attained the authority which attended it in France, and it was suspended for reasons of economy by Henry VIII. It is now filled by temporary appointment on great occasions of state, as the coronation of the monarch, etc. Formerly the Lord High Constable, in conjunction with the Earl Marshal of England, held the courts of chivalry, or honor, and the courts-martial of the kingdom. But the former jurisdiction has now completely lapsed, and courts-martial are held by the ordinary military authorities. The court of the constable and marshal, therefore, while still nominally in existence, is practically obsolete. The office of constable still survives in Scotland, where it has become an hereditary dignity of the earls of Errol, but shorn of its former authority.

2. The office of constable also existed in England with the signification of warden or keeper of certain royal castles and fortified towns. In a few cases it long survived as an hereditary office, and in some others it is filled by royal appointment. Of the latter class are the constables of the Tower of London and of Windsor and Dover castles.

3. The peace officer whom we know as constable is the petty constable of English law, an officer of great antiquity—so called to distinguish him from the High Constables of Hundreds, created by the Statute of Winchester, 13 Edw. I (1285). The office has in recent years lost much of its importance in England, the institution of county and borough police having deprived it of most of its functions. In most of the United States, however, outside the cities, the constable continues to be the principal officer of the peace. As such he is invested with large powers of arresting, imprisoning, executing civil and criminal process, and often with limited judicial functions. His duties are generally defined by statute. In cities, as in English boroughs and counties, his functions have generally been transferred to the police (q.v.). Consult: Bacon, *New Abridgment of the Law*, title *Constable;* Dalton, *The Country Justice: Containing the Practice, Duty, and Power of the Justices of the Peace.* See PEACE; SHERIFF.

CONSTABLE, ARCHIBALD (1774–1827). A Scottish publisher, born at Carnbee, Fife. He became famous for the sumptuousness of his editions and the liberality shown towards his employees. He published nearly all of Sir Walter Scott's works, and his failure in 1826, with that of Ballantyne and Company, involved Scott for £120,000. Constable became publisher of the *Scots' Magazine* (1801) and of the *Edinburgh Review* (1802), and owner of the *Encyclopædia Britannica* (1812), which he enlarged. He edited the *Chronicle of Fife* (1810) and wrote a *Memoir of George Heriot* (1822). Consult Constable, *Archibald Constable and his Literary Correspondents* (3 vols., Edinburgh, 1873), and Lockhart, *Life of Scott* (7 vols., London, 1838).

CONSTABLE, HENRY (1562–1613). An English poet. He was graduated from St. John's College, Cambridge, in 1580, became a Roman Catholic and therefore found it best to live mostly on the Continent. He died at Liége, Oct. 9, 1613. He wrote many pretty pastorals and sonnets to Diana, sometimes marred by fantastic conceits. His one independent publication was *Diana*, which first appeared in 1592 in pamphlet form, to reappear in 1594 (though wrongly dated 1584) with additional poems, and to be augmented, from manuscripts, in 1813 by H. J. Todd. It is interesting for the place it takes in the early development of the sonnet in England. Constable contributed four pastorals to *England's Helicon* (1600), and sonnets to other collections. Sixteen "Spiritual Sonnets," attributed to him, were first printed by T. Park in *Heliconia* (1815). Constable's contribution to English song is slender, and the authenticity of many of the poems attributed to him is not established by evidence. It was his fortune to be associated through his poetry with Shakespeare and Sir Philip Sidney. The former pays him the compliment of borrowing from his verse; and the latter's *Apology of Poetry* (1594) is prefixed by sonnets by Constable, addressed to the author of that book.

CONSTABLE, JOHN (1776–1837). An English landscape painter, the founder of modern landscape art. He was born on June 11, 1776, in East Bergholt, Suffolk, the son of a wealthy miller. His father intended him for the clergy and afterward tried him as a miller, but the youth's taste was all for art. He first studied painting in company with a local amateur named Dunthorne, with whom he painted the scenes about his native home, always in the open air. In 1795 he went to London in order to study painting, but was recalled soon afterward. In 1799 he returned to London and entered the Academy School, where he received instruction from Farrington and Reinagle. He was greatly impressed with the works of Ruysdael in the National Gallery. At first he attempted portraits and historical subjects, according to the custom of the day, but in 1803, weary of studying pictures and of acquiring

truth second-hand, he returned to East Bergholt. From this time he painted landscapes from nature only, passing at least the summer months entirely in the country near his home.

His work, however, was too revolutionary and original to become popular in his native land, although he found a few devoted friends who believed in him and bought his pictures. Among these were Sir George Beaumont, the Mæcenas of his boyhood, Bishop Fisher, of Salisbury, and his nephew, Archdeacon Fisher, Constable's most intimate friend, and, above all, Miss Maria Bicknell, whom he afterward married. He did not sell a single landscape to a stranger until 1814, but was compelled to support himself by painting portraits and copies of paintings. But, never discouraged, he worked on in his quiet way, knowing well that the future was his. At length he found recognition in France. In 1823 three of his pictures were exhibited at the Salon, where they excited the greatest admiration and were accorded the place of honor in the exhibition. The King of France sent Constable a gold medal, and the same honor was accorded to him in the following year at Lille. At last, in 1829, came the tardy honor of membership in the Royal Academy, but accompanied by an ungracious remark on the part of the president and too late to afford satisfaction to the painter.

Constable was a simple and noble character, who bore bravely discouragement and adversity and never wavered in his ideal of art. His other great passion in life was his love for his wife, Miss Maria Bicknell, to whom, after many difficulties, he was secretly wedded in 1816. With a family of seven children, he was sometimes hard pressed for money, until he was at length relieved by his own inheritance and the ample inheritance of his wife. In 1827 he removed to his favorite Hampstead, where many of his best pictures were painted. He was greatly bereaved by the death of his wife in 1828 and died unexpectedly on March 30, 1837.

Constable was a great innovator in landscape painting, and he is, more than any other, the father of the modern school. The old Dutch masters gained their effects by giving the forms of objects, placing more weight upon drawing than upon color, in which they achieved harmony by a uniform brown tone. Constable saw that landscape is rather a problem of light and air, and that its effect depends upon the light and shadow in which the objects are seen. He was the first to paint the subtle gradations of the atmosphere and to show not only the objects themselves, but how he saw them. He laid on his colors fresh and fair, as they are in nature, applying to oil paintings the results of water color. His pictures are always harmonious in tone. He renders the effect of a landscape, suppressing unimportant details—a tendency which increases with his later years. He frequently uses the palette knife, sometimes executing the entire picture by this means. In consequence of his teachings an able group of landscape painters arose in England in the forties and fifties, the most important of whom was David Cox (q.v.). His influence upon British painting during the last three decades has been even greater. His influence on the Barbizon masters has, however, been exaggerated. See BARBIZON, PAINTERS OF.

Constable's work may best be studied in the national collections of London, which have received valuable legacies of his paintings from his descendants. In the National Gallery are the "Cornfield" (1826), "Valley Farm" (1835), "Hay Wain," and many others; in the Tate Gallery, "The Bridge at Gillingham," "Harwich; Sea and Lighthouse," etc.; in South Kensington Museum, "Deadham Mill" (1820); "Hampstead Heath" (1823); and "Water Meadows near Salisbury," besides many other paintings, water colors, and many admirable studies. He is also well represented in the English provincial museums, in the Louvre ("Hampstead Heath"); in the Metropolitan Museum, New York, by "Bridge on the Stour" and the splendid "Scene on the River Stour," called "The White Horse" (J. P. Morgan collection); in the Wilstach collection, Philadelphia, the Toledo Art Museum, and other private collections of the United States. Twenty of his chief works were published in 1833 in a series of etchings, and others in 1855, by David Lucas.

Consult: Muther, *History of Modern Painting* (London, 1896); Leslie, *Memoirs of Constable* (ib., 1843; new ed., 1896), containing Lucas's plates; Brock-Arnold, *Gainsborough and Constable* (ib., 1881); Wedmore, *Studies in English Art* (ib., 1876–80); Holmes, *Constable and his Influence on Landscape Painting* (New York, 1903); Windsor, *John Constable, R. A.* (London, 1903); Henderson, *Constable* (ib., 1905); Tompkins (ib., 1907); Bankart (ib., 1910).

CON'STANCE (Ger. *Konstanz* or *Kostnitz*). A fortified border city of the Grand Duchy of Baden, situated 1300 feet above sea level, on both banks of the Rhine where it leaves Lake Constance, about 35 miles northeast of Zurich (Map: Germany, C 5). Two old city gates mark the remains of its ancient fortifications. The cathedral, founded in the eleventh century and rebuilt in the fifteenth, has fine hand-carved oak portals and choir stalls. Here Huss was sentenced by the council to be burned at the stake. Other ecclesiastical buildings of interest are the church of St. Stephen and, on an island, the Dominican monastery in which Huss was confined. Notable secular buildings include the old Kaufhaus, containing the hall in which the conclave of cardinals met to elect a pope at the time of the famous council in 1417; the Rosgarten, the former guildhall of the butchers, containing an interesting museum; the town hall, with the ancient city archives; and the Barbarossa Inn, where Frederick of Barbarossa signed a treaty with the cities of the Lombard League in 1183. Constance has manufactures of chronometers, wool, linen, cotton, carpets, soap, and chemicals. Pop., 1900, 21,345; 1910, 27,591. The Roman *Constantia* was known at least as early as the third century. In 570 it was made the seat of a bishopric, which existed as one of the most powerful in Germany until its secularization in 1803. In 780 Constance was given municipal rights and in 1192 was made a free Imperial city. For joining the Schmalkaldic League it was deprived of its Imperial privileges in 1548 and presented to Archduke Ferdinand of Austria. In 1806 it became a part of the Grand Duchy of Baden. Consult: *Geschichte der Bischöfe von Konstanz* (Innsbruck, 1894–96); *Chroniken der Stadt Konstanz* (1890–92); A. Maurer, *Der Uebergang der Stadt Konstanz an das Haus Oesterreich* (Frauenfeld, 1904).

CON'STANCE. 1. Daughter of the Emperor and eventually the wife of King Alla, in Chaucer's *Man of Law's Tale*. 2. The mother



JOHN CONSTABLE
"THE HAY WAIN"
FROM THE PAINTING IN THE NATIONAL GALLERY, LONDON

of Prince Arthur, in Shakespeare's *King John*. 3. Nonesuch's daughter, enamored of Lovely, in Dryden's *Wild Gallant*. 4. The heroine of Brome's *The Northern Lass*. 5. Fondlove's daughter and Wildrake's mistress, in Knowles's comedy *The Love Chase*. 6. The daughter of the Provost, later proved a serf, in G. W. Lovell's *Provost of Bruges*.

CONSTANCE, or **CUSTANCE**, DAME CHRISTIAN. A rich and beautiful widow in Udall's play *Ralph Roister Doister*.

CONSTANCE, COUNCIL OF. The sixteenth ecumenical Church council (1414–18) called by Pope John XXIII, at the suggestion of the Emperor Sigismund, to attempt to heal the papal schism (see SCHISM, WESTERN), the scandal of which was then at its height; to deal with the Hussite heresy; and to consider measures for the general reform of the Church. It was the most brilliant and numerously attended Church council ever held. Dignitaries of church and state, with large retinues, attended from all the countries of Europe; and many merchants and artisans, with a miscellaneous crowd, were attracted by the occasion. It is said that more than 18,000 priests, and in all about 100,000 strangers, were gathered in the city. The predominating influence of Pope John was nullified by a decision to vote by nations rather than by individuals, and it was proposed that all the three rival popes should abdicate. John fled from the city and attempted to dissolve the council, which then (April, 1415), under the lead of Jean de Gerson (q.v.), declared itself the highest authority of Christendom and above the Pope. John was deposed and condemned to imprisonment for life. Gregory XII voluntarily withdrew, and Benedict XIII was deposed and retired to Spain, where he spent the remainder of his life, without power or influence. The election of a new Pope was temporarily postponed. Huss was condemned after a turbulent trial, and burned at the city gate, July 6, 1415. Jerome of Prague was also condemned, and perished at the stake, May 30, 1416. The movement for reform came to nothing. A beginning had been made, when the cardinals, with the help of the French, succeeded (November, 1417) in ending the schism and electing Otto Colonna (Martin V) Pope, who brought the proceedings to an end with some slight concessions. Consult: Richtenthal, *Kronik des Konziliums in Konstanz* (Augsburg, 1533; new ed., Tübingen, 1882); Leufant, *History of the Council of Constance* (Eng. trans., London, 1730); Finke, *Forschungen und Quellen zur Geschichte des Konstanzer Konzils* (Paderborn, 1889); Creighton, *A History of the Papacy during the Reformation* (London, 1882); Wylie, *The Council of Constance* (ib., 1900). See JOHN XVIII; GREGORY XII; MARTIN V; HUSS, JOHN; JEROME OF PRAGUE.

CONSTANCE, LAKE (named from the city of *Constance*, Ger. *Konstanz*, or *Kostnitz*, Lat. *Constantia;* German *Bodensee*, formerly *Bodemsee*, *Bodmensee*, *Bodmansee*, from the castle of *Bodman* on its shores, ML. *Lacus Podamicus*, *Mare Podanum*, Lat. *Lacus Brigantinus*, *Lacus Venetus et Acronius*). A lake of glacial origin, situated at the north base of the Alps and forming a portion of the boundary between Switzerland and Austria (Vorarlberg) on the south, and the German states of Baden, Württemberg, and Bavaria on the north (Map: Switzerland, D 1). It is on the course of the Rhine, which enters from the south and flows out in a westerly direction. Lake Constance extends northwest and southeast, and at its northwest end forks into a northern prolongation known as Ueberlinger See, which has a broad connection with the main lake; and into a southern fork, called the Lower Lake (Untersee), formerly known as the Zeller See, connected with the main lake by a narrow channel, 600 to 1600 feet wide, and only 2½ miles long. The outlet of the lake is at the foot of this arm. The height of its surface is 1309 feet above sea level; the length of the lake is about 40 miles; the greatest breadth, 10½ miles; the length of shore line, 160 miles, and the area, 208 square miles. The greatest depth is 827 feet. The water of the lake is subject to sudden rises of from 3 to 12 feet, due to the melting of the snows. A number of minor streams discharge into the lake, nearly all of them on the northeast side. Among these tributaries are the Bregenzer Ach, Leblach, Argen, Schussen, Steinach, Ach of Uhldingen, and Stockach.

The lower lake is covered with ice nearly every winter, but it is only rarely, in an extreme winter, that the surface of the main lake becomes frozen. The lake contains 26 varieties of fish, among them salmon and salmon trout, and 22 species of shellfish. In prehistory the shallows of Lake Constance were the seat of an extensive community of lacustrine culture; the remains of its pile dwellings have yielded richly of primitive artifacts which have been subjected to such exhaustive study as to establish the Lake of Constance as the most important source of knowledge of this stage of human society. Lake Constance formerly extended much farther south than at present, and even within historic times, in the fourth century, it extended as far as Rheineck (Rheinegg). The towns on the shores of Lake Constance are Bregenz, Lindau, Friedrichshafen, Ueberlingen, Constance, Arbon, and Rorschach. Steamboats navigate the lake, and railways follow its shores.

CON'STANS. In the old romances, a king of Britain, and grandfather of Arthur.

CONSTANS, FLAVIUS JULIUS. A Roman Emperor (337–350 A.D.). He was the youngest son of Constantine the Great (by Fausta) and was born 323 A.D. (or 320). He was made Crown Prince (*Cæsar*) in 333 and became Emperor, together with his brothers Constantine and Constantius, on the death of their father in 337. Constans received the government of Italy, Illyricum, and Africa. In 340, however, war broke out between the brothers, and Constantine was killed near Aquileia. Constans now ruled also his brother's dominions. He was killed by a soldier of the self-proclaimed Emperor, Magnentius, January, 350.

CONSTANS, kôn'stäns', JEAN ANTOINE ERNEST (1833–1913). A French statesman, born at Béziers. He was a professor of law in 1876, when he was elected a deputy and affiliated with the Left Centre. He was Undersecretary of State in the Freycinet cabinet in 1879, and was Minister of the Interior in the Freycinet and Ferry cabinets (1880 and 1881). After serving for one year as Governor-General of Indo-China, he was compelled in 1888 to resign this position as incompatible with his duties as a deputy. From 1889 to 1892 he was again Minister of the Interior (in the cabinets of Tirard and Freycinet), and his vigorous measures served to over-

throw Boulangism. In 1897 he was elected to the Senate, and in the following year became Ambassador to Constantinople.

CONSTANT, kôn'stän', BENJAMIN JEAN JOSEPH BENJAMIN, also written BENJAMIN-CONSTANT (1845–1902). A French historical and portrait painter. He was born in Paris, June 10, 1845, studied at the Ecole des Beaux-Arts in Toulouse, and in 1866 obtained a municipal prize entitling him to free instruction in the Beaux-Arts in Paris, where he was also a pupil of Cabanel. A journey to Morocco in 1872 strongly influenced his artistic development. Among his chief Oriental scenes are the "Last Rebels" and "Justice in the Harem," both in the Luxembourg Gallery, "Les Chérifas," and "Moroccan Prisoners" (Bordeaux). His large canvas, "The Entrance of Mahomet II into Constantinople" (Toulouse Museum), received a medal in 1876. All these works show him to be a fine colorist and a master of technique. After 1880 he changed his manner, devoting himself to mural decorations and to portraits. The most prominent examples of the former are a great plafond in the Hôtel de Ville, Paris, entitled "Paris Convoking the World," his paintings in the New Sorbonne, representing "Literature," "The Sciences," and the "Academy of Paris," and the plafond of the New Opéra Comique. He painted important mural decorations in other cities of France and was distinguished also as a portrait painter, especially in England, where he was a favorite of the aristocracy. A good example of his portraiture is "Mon Fils André" (Luxembourg), which took the medal of honor at the Salon in 1896. His more recent sitters include Pope Leo XIII and Queen Alexandra of England (1901); Lord Savile and M. de Blowitz (1902). Constant was made a member of the Institute in 1893, and was a commander of the Legion of Honor. He visited the United States several times and painted a number of portraits, now in private possession. The Metropolitan Museum of New York possesses a large mural decoration by Constant representing "Justinian in Council." Constant was a writer of repute, having contributed a number of studies on contemporary French painters. Consult Stranahan, *Modern French Painters* (New York, 1893).

CONSTAN'TA. See KÜSTENDJE.

CONSTANT DE REBECQUE, kôn'stän' de re'bĕk', HENRI BENJAMIN (1767–1830). A distinguished French politician and novelist, born at Lausanne, Oct. 23, 1767. His family was Protestant and had taken refuge in Switzerland from religious persecution. Till 13, Constant studied at Lausanne, then successively at Oxford, Erlangen, and Edinburgh, laying the foundations of a cosmopolitan culture that explains his affinity for Madame de Staël. During his stay in England he became imbued with Whig tendencies and a deep admiration for the English system of constitutional monarchy. He was a moderate Republican during the Revolution, and after 1795 settled in Paris, where his political writings, especially his pamphlet, *De la force du gouvernement actuel de la France,* attracted great attention. In 1799 Bonaparte called him to the tribunate, but he opposed the First Consul's attack upon constitutional rights, and was exiled in 1802. His political career thus checked, he turned to literature and accompanied Madame de Staël, like him an exile, on her travels. At Weimar he met and came under the influence of Goethe and Schiller. He translated, or rather adapted, the latter's *Wallenstein.* It was during this period that he entered into his second matrimonial venture, with Charlotte von Hardenberg, his first wife, Baroness Chramm, having divorced him in 1793. He also wrote *Adolphe* (1816), a literary result of his relations to Madame de Staël, who had put her experience with him into *Delphine.* This sole novel of the versatile politician is a clear, keen, relentless analysis of the mutual degradation resulting from ill-assorted matings. It is brief, almost cruelly simple, and told in a style as precise and dry as that of a mathematical demonstration. It is considered as the original model of the psychological novel in France. Chivalrous towards Madame de Staël, he is pitiless to himself, to his father, to his former love, Madame de Charrière, and to their officious friend, Madame Récamier. Constant's *Correspondence,* his *Journals,* all that we know of his life, show him, as he reveals himself here, always seeking emotion, never attaining passion. He repeatedly and consistently fought for his opinions, even when his future and very life were at stake. With this novel still unpublished, he returned to France after Napoleon's first abdication (1814), with the prestige of his stirring pamphlet *De l'esprit de conquête et de l'usurpation* (1813). He expected to find the Restoration more favorable to constitutional liberty than Napoleon's "government of mamelukes," but he was soon undeceived. During the Hundred Days he coöperated with the returned Emperor, and assisted in drawing up the *acte additionel* to the constitution. He was not false to his original principles in this step, for he was actuated by the vain hope that a strong government might be a better guarantee of individual liberty, as in England. After Waterloo he retired to England, but was permitted to return to France in 1816. He joined the liberal writers of the day and was elected deputy in 1819. However, his spirit was somewhat crushed now by Madame de Stael's death and still more so, later on, by his unrequited love for the famous beauty, Madame Récamier. He became the acknowledged leader of the opposition to Charles X, and the most brilliant champion of a constitutional monarchy. He deplored the violence of the revolution of July, which occurred while he was convalescent in the country. At the request of Lafayette he returned, and for the few months that remained to him of life supported the government of Louis Philippe and the principles to which his political life had been dedicated. He died at Pau, Dec. 8, 1830. Constant was not a graceful speaker, but a singularly effective writer. His speeches are collected as *Discours* (2 vols., 1828); his essays on representative government as *Cours de politique constitutionelle* (4 vols., 1817–20). His *De la Liberté des brochures, des pamphlets, et des journaux considérée sous le rapport de l'intérêt du gouvernement* (1814), a most forcible pamphlet on free speech, is undoubtedly one of his best contributions to the progress of human thought. He wrote also *Mémoires sur les Cent Jours* (1820), and *De la religion considérée dans sa source, ses formes, et ses développements* (1824–31), visibly saturated with German mysticism, in which he undertook to show that the religious instinct remained essentially unaffected through all changes of dogma and forms. In teaching that Christianity had "introduced moral and political

liberty into the world," he widened the breach with the thought of the eighteenth century shown and in part caused by the *Génie du Christianisme* of Chateaubriand. "Lucian was incapable of understanding Homer," he said; "Voltaire has never understood the Bible."

Consult: Faguet, *Politiques et moralistes* (Paris, 1898); Sainte-Beuve, *Nouveaux Lundis*, vol. i (Paris, 1863), and *Portraits littéraires*, vol. iii (ib., 1864); *Le cahier rouge de Benjamin Constant* (1907); *Journal intime* (1804–16), ed. by D. Megari (1895); G. Rudler, *La jeunesse de Benjamin Constant* (1900); G. Rudler, *Bibliographie Critique* (1909).

CONSTANTIN, kōn'stăN'tăN', ABBÉ. The lovable, benevolent old parish priest in Ludovic Halévy's graceful romance *L'Abbé Constantin* (1882). A successful comedy under the same title was adapted from the romance by Crémieux and Decourcelle, and presented at the Gymnase in 1887.

CONSTANTINA, kōn'stăn-tē'nȧ. A town of Spain, in the Province of Seville, about 40 miles north-northeast of Seville (Map: Spain, C 4). It is in a mountainous region and has lead mines, lumbering interests, distilleries, and tanneries. Pop., 1900, 9687; 1910, 11,295.

CONSTANTINE, kōn'stăn-tēn'. A fortified city and a Catholic episcopal see, the capital of the Department of Constantine, Algeria, 54 miles by rail southwest of Philippeville (Map: Africa, E 1). It is situated on a precipitous hill with a flat summit, two sides of which are washed by the Rummel, flowing through a deep and narrow ravine. It is a natural citadel, 830 feet above the river and 2162 feet above sea level; surrounded by walls which the Arabs made out of Roman sculptured stones. The Moorish or older portion of the town is close and dirty. Its chief ancient buildings are the Kasba, or Roman citadel; the palace of the Bey; the harem of Salah; and three mosques, one of which, Suk-er-Rezel, dating from 1143, is now the Christian church of Notre Dame des Sept Douleurs. The modern or French portion has wide streets and open squares. Its principal buildings are the Palais de Justice, administrative buildings, the Protestant church, and a theatre. A Mohammedan religious seminary, a French government college, and other educational institutions for Arabic and European culture have been founded. The town is a centre of the leather industry and also has manufactures of woolen cloths, saddlery, and a considerable grain trade with Tunis. Its seaport is Philippeville, to the northeast. Constantine, named after the famous Roman Emperor, anciently one of the most important towns of Numidia (Carta of the Carthaginians; Cirta of the Romans), was destroyed in the wars of Maxentius against Alexander, about 311 A.D., but was rebuilt by Constantine the Great in 313. It was a flourishing town in the twelfth century, trading with Venice, Genoa, and Pisa. The French captured it in 1837. Pop., 1901, 48,243, including 15,096 French residents; 1906, 46,806; 1911, 61,413.

CONSTANTINE, kōn'stan-tīn. The name of two popes.—CONSTANTINE I (Pope 708–715), a Syrian by birth. His pontificate was marked by the submission of Felix, Archbishop of Ravenna, to the supremacy of Rome, and by his voyage to Constantinople, at the invitation of Justinian II, to confirm the decrees of the Quinisextan Council, which his immediate predecessor had refused to do.—CONSTANTINE II (Pope 767–768). He was forced into the see by his brother, Duke Toto of Nepi, but within a few months was overthrown and blinded by an opposing faction, his deposition being solemnly confirmed by the Lateran Synod of 769, which laid down the rule that the Pope must be chosen from the College of Cardinals. On this account his name is often excluded from the list of popes.

CONSTANTINE I, FLAVIUS VALERIUS AURELIUS CONSTANTINUS, surnamed "the Great." A Roman Emperor (306–337 A.D.). He was born about 274 A.D., at Naissus, in Mœsia (Servia). He was the eldest son of Constantius Chlorus. He accompanied Diocletian, in that monarch's famous Egyptian expedition (296); subsequently he served under Galerius in the Persian War. In 305 the two emperors, Diocletian and Maximian, abdicated, and were succeeded by Constantius Chlorus and Galerius (q.v.). Galerius, who could not endure the brilliant and energetic genius of Constantine, took every means of exposing him to danger; in this period, it is believed, Constantine acquired that mixture of reserve, cunning, and wisdom which was so conspicuous in his conduct in after years. At last Constantine fled to his father, who ruled in the West, and joined him at Boulogne just as he was setting out on an expedition against the Picts in North Britain. Constantius died at York, July 25, 306, having proclaimed his son Constantine his successor. The latter now wrote a conciliatory letter to Galerius and requested to be acknowledged as Augustus. Galerius did not dare to quarrel with Constantine, yet he granted him the title of Cæsar only. Political complications now increased, and in a short time no fewer than six emperors were "in the field"—Galerius, Licinius, and Maximin in the East, and Maximian, Maxentius (his son), and Constantine in the West (308). Maxentius, having quarreled with his father, forced him to flee from Rome. The latter took refuge with Constantine, but was ungrateful enough to plot the destruction of his benefactor. This being discovered, Maximian fled to Marseilles; its inhabitants gave him up to Constantine, who put him to death (309). Maxentius professed great anger at the death of his father and assembled a large army, with which he threatened Gaul. Crossing the Alps by Mont Cénis, Constantine thrice defeated Maxentius—first near Turin, then under the walls of Verona, and finally near the Milvian Bridge at Rome, Oct. 27, 312; Maxentius himself, in the last of these engagements, was drowned in an attempt to escape across the Tiber. During this campaign Constantine was said to have had the apparition in the sky of a luminous cross with the words, Ἐν τούτῳ νίκα, *En toutō nika* (in Latin, *Hoc vince*, 'By this conquer'), as the contemporary historians Eusebius and Lactantius record. This vision, it is said, spurred him on against Maxentius and made him a Christian. Constantine now entered the capital, disbanded the prætorians, and adopted other judicious measures for allaying the public excitement. He was honored with the title of Pontifex Maximus, or supreme dignitary of the pagan hierarchy.

Constantine was now sole Emperor of the West. Similarly, by the death of Galerius in 311 and of Maximin in 313, Licinius became sole Emperor of the East. In 314 a war broke out between the two rulers, in which Licinius was worsted and was fain to conclude a peace by the cession of Illyricum, Pannonia, and Greece. For

the next nine years Constantine devoted himself vigorously to the correction of abuses in the administration of the laws, to the strengthening of the frontiers, and to chastising the barbarians, who learned to fear and respect his power. In 323 war was renewed with Licinius, who was defeated and ultimately put to death. Constantine was now at the summit of his ambitions—the sole governor of the Roman world; but Rome was no longer the political or geographical centre of this world, and he determined to move the capital to Byzantium, which he solemnly inaugurated in 330 under the name of Constantinopolis, the 'City of Constantine.' A further motive for the removal has been found in the suggestion that Constantine, who had now fully identified himself with Christianity, wished to avoid conflict with the pagan feeling that still was deep-seated at Rome. From Constantinople he ruled his vast empire until his death, which occurred May 27, 337. From the reign of Constantine Christianity was not only recognized and tolerated, but became the religion of the rulers themselves. Of Constantine's personal feeling in the question of Christianity and paganism much has been written. By birth and education he was much inclined towards the growing faith; his mother was a Christian, and his father, Constantius, though a pagan, was very tolerant and would allow no direct acts of violence in his part of the Roman domain during the great persecution of 303. Constantine was by nature mild and kind-hearted; his legislation was governed by humane principles. He abolished the system of branding the faces of convicts; ordained that masters who killed their slaves were guilty of homicide, and published an edict of toleration which insured liberty of conscience throughout the Empire. The Christians were as yet but a minority of the whole population, but the Emperor openly sympathized with them and did not hesitate, upon occasion, to insult the pagans. Yet his Christianity was not deep-seated, though doubtless quite sincere as far as it went. He looked upon his overthrow of Maxentius as due to the help of God, *instinctu divinitatis*, as the inscription on his arch in Rome (see CONSTANTINE, ARCH OF), built in 315, shows; but the very form of expression displays a concession to pagan sensibilities that a rigorous Christian of the period would not have made. He retained the traditional pagan title of Pontifex Maximus, as did his Christian successors of the fourth century, and his coins still bear the figures and the names of the old gods. In the Arian controversy he sided with the Catholic bishops, and it was he who called the great Council of Nicæa (Nice) in Bithynia in 325 (see NICE, COUNCIL OF) and presided at the first sitting. By this council the doctrine of consubstantiality was defined, and the Nicene Creed was adopted. He did not receive baptism until shortly before his death. Consult Firth, *Constantine the Great* (New York, 1905), and *The Cambridge Mediæval History*, vol. i (ib., 1911).

CONSTANTINE I, KING OF GREECE (1868–). He was born in Athens, the eldest son of King George I and Olga, the daughter of the Russian Grand Duke Constantine Nikolayevitch (q.v.) and niece of Czar Nicholas I. He was reared in the Greek Orthodox faith and studied at the universities of Berlin and Leipzig. In 1889 he married Princess Sophia, sister of Emperor William II of Germany. As heir to the throne, he was styled Duke of Sparta and received a careful military training. He was commander in chief of the Greek forces in the brief but disastrous Turkish War of 1897, and for some years subsequently suffered unmerited blame for the military reverses of the Greeks. The agitation against him was carried so far that the Military League compelled him in 1909 temporarily to relinquish his command and retire from the country. In the Balkan War (q.v.), of 1912–13, however, he acquitted himself so well as commander in chief of the Greek armies operating in Macedonia against the Turks that he was hailed as a national hero. His triumphant entry into Saloniki on Nov. 8, 1912, marked his complete conquest of the hearts of his countrymen. His father, while paying a visit to Saloniki, was assassinated on March 18, 1913, and Constantine took the oath at Athens as constitutional King of the Hellenes on March 21. As King, he continued the series of Greek victories by wresting Janina from the Turks and by driving the Bulgarians from Macedonia and the greater part of Thrace, and, as a result of the treaties of London (May 30, 1913) and Bucharest (Aug. 10, 1913), secured sovereignty over an area twice as extensive as his father had ruled. Constantine has five children, of whom the eldest, Prince George (born 1890), is heir apparent. See GREECE, *History*.

CONSTANTINE II, or JUNIOR, FLAVIUS CLAUDIUS CONSTANTINUS. A Roman emperor (337–340 A.D.). He was the eldest son of Constantine the Great, and was born, 317, at Arelate (Arles), in Gaul. He became joint Emperor with his brothers, Constantius and Constans, on the death of their father, in 337, receiving Gaul, Britain, Spain, etc., as his share of the Empire. In 340 he invaded the dominions of Constans and was killed in the battle of Aquileia (340).

CONSTANTINE VII, PORPHYROGENITUS (905–959). A Byzantine emperor. He became, at the age of seven, associate Emperor with his uncle, and at eight sole ruler; but in reality he was the ruler only after the death of his father-in-law, Romanus (q.v.), in 945. Even then he paid more attention to literature than to state affairs. He wrote a life of his grandfather, Basil I, and a number of political works, including *On the Themes*, *On the Ceremonies at the Court of Constantinople*, and *On the Administration of the Empire*. Some of his works are published, in 3 vols., in the Bonn edition of the Byzantine Historians (1829–40). In addition he caused a large number of works to be written for the sake of preserving what was best in the older literature; these included excerpts from the classical authors; encyclopædic collections on history, medicine, and other subjects; and especially the *Basilika*, or collection of laws. He also gave new life to the university at Constantinople. Consult Krumbacher, *Geschichte der byzantinischen Litteratur* (2d ed., Munich, 1897), and Rambaud, *L'Empire grec au Xe siècle; Constantin Porphyrogénète* (Paris, 1870).

CONSTANTINE XI, PALÆOLOGUS (1404–53). The last of the Byzantine emperors. He was the son of the Emperor Manuel II. He had gained possession of Morea and of much of the Peloponnesus and had won many victories over the Turks. In 1446 Murad II defeated him and compelled him to surrender the Peloponnesus. His brother, the Emperor John VIII, died in 1448, and Constantine became Emperor in 1449. He at once went to Constantinople and showed



THE ARCH OF CONSTANTINE

himself an intelligent, brave, and resolute ruler, but his position was a hopeless one. Mohammed II was preparing for the final assault on Constantinople, and Constantine appealed in vain to the princes of Christendom. A long siege preceded the capture of the city, which was finally accomplished May 29, 1453. In the desperate battle waged at the gates of the city Constantine fell, slain by some unknown hand. Consult Mijatovitch, *Constantine, the Last Emperor of the Greeks* (London, 1892), and Pears, *Destruction of the Greek Empire* (ib., 1903). See BYZANTINE EMPIRE.

CONSTANTINE, KONSTANTIN NIKOLAYEVITCH (1827–92). A grand duke of Russia, the second son of Emperor Nicholas I and brother of Alexander II. Having been trained for the navy from early youth, he rose rapidly in rank until he became grand admiral of the Russian fleet and, in addition, held numerous military offices. During the Crimean War he commanded the Russian fleet in the Baltic and directed the defensive preparations which held the English and French armaments in check before Cronstadt. He earnestly supported his brother's liberal reform plans and endeavored in many ways to promote the cause of enlightenment in Russia. He was appointed Governor of Poland in 1862, but failed in his attempts to reconcile the Poles and resigned soon after the outbreak of the revolution in 1863. In January, 1865, he was appointed President of the Council of the Empire. On the accession of his nephew, Alexander III, he was deprived of most of his offices, however, and soon retired altogether from public life, living in retirement in Crimea for the rest of his life.

CONSTANTINE (KONSTANTIN), PAVLOVITCH (1779–1831). A grand duke of Russia, the second son of the Emperor Paul I. He was brought up together with his brother Alexander under the supervision of Catharine II. Having been appointed inspector general of cavalry under Alexander I, he was given command of a division of the Russian army in the Napoleonic campaigns. On the establishment of Polish sovereignty (1815), he was given chief command of the Polish army. After the Congress of Vienna the government of the newly created Kingdom of Poland was intrusted to him by his brother, the Emperor Alexander I. In January, 1822, on his divorce and remarriage out of the ranks of royalty, he executed a private deed by which he resigned his claims to the throne in the event of Alexander's death, and, when that event took place in 1825, he adhered to this resignation, although he had been proclaimed Emperor in the so-called Decembrist uprising. (See RUSSIA.) The succession thus fell to his younger brother Nicholas. The character of Constantine's administration in Poland was not such as to conciliate any class of the people, and a widespread conspiracy was formed. The revolution of July (1830) in France supplied the spark which was needed to kindle the revolution in Poland, and he was obliged to flee for his life. He died soon after of the cholera.

CONSTANTINE, ARCH OF. A famous arch at Rome, between the Palatine and the Cælian hills, southwest of the Coliseum, at the junction of the Sacred and the Triumphal ways. It was erected in 315 A.D., to commemorate the Emperor Constantine's victory over Maxentius. (See CONSTANTINE I.) The arch is the best-preserved monument of ancient Rome, probably because the fact that its builder was a Christian Emperor saved it from destruction during the devastations of the Middle Ages. It has three openings and four columns on each main face. The columns support pedestals, on which were statues of barbarian prisoners, sculptured in the round. Of the reliefs with which the arch is richly decorated, some belong to the time of Constantine; others were taken by Constantine from earlier structures. Consult: Platner, *The Topography and Monuments of Ancient Rome* (New York, 1911); Frothingham, "The Mystery of the Arch of Constantine Unveiled," in the *Century Magazine* for January, 1912; Frothingham, "Who built the Arch of Constantine?" in *American Journal of Archæology*, 2d series, vols. xvi, xvii (1912–13).

CONSTANTINE, BASILICA OF. A vast basilica begun by Maxentius and completed by Constantine I (q.v.), on the site of a former warehouse, at Rome. It had a nave about 250 feet long, with a vaulted roof over 100 feet high and 80 broad. The original entrance faced east, towards the Coliseum. Constantine added a second entrance, facing south, towards the Sacred Way. Thenceforth the basilica gave the same impression of three vaulted parallel halls, whether one entered from the east or from the south. Eight monolithic marble columns adorned the nave; of these only one remains, having been removed in 1613 to the piazza in front of the church of Santa Maria Maggiore. Consult Hülsen-Carter, *The Roman Forum* (Rome, 1906), and Platner, *The Topography and Monuments of Ancient Rome* (New York, 1911).

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CONSTAN'TINO'PLE (Lat. *Constantinopolis*, from Gk. *Κωνσταντίνου πόλις, Konstantinou polis*, city of Constantine, Turk. *Istambol* or *Stambol*, from Gk. *εἰς τὴν πόλιν, eis tēn polin*, or, in the corrupted dialect of the people, *ἐς τὰμ βόλιν, es tam bolin*, to the city). The capital and largest city of the Ottoman Empire, situated in the extreme eastern part of European Turkey, on a hilly promontory washed by the Sea of Marmora, the Bosporus, and the Golden Horn, a narrow inlet about 4 miles long and from one to 4 miles wide, extending in a northwesterly direction from the Bosporus; lat. 41° N., long. 28° 59′ E. (Map: Balkan Peninsula, G 4). With its many mosques, kiosks, and extensive gardens, it presents from the sea a magnificent appearance, which is greatly enhanced by the natural picturesqueness of the site. The town is divided into quarters in which members of the various creeds segregate. South of the Golden Horn lies Stambol, the Mohammedan centre. It occupies the site of ancient Byzantium. This section is not only the heart of the Turkish Empire, but also of the Islamic world. The suburbs of Galata and Pera are situated on the north and opposite shore of the Golden Horn, which is spanned by two iron pontoon bridges. Stambol is sur-

himself an intelligent, brave, and resolute ruler, but his position was a hopeless one. Mohammed II was preparing for the final assault on Constantinople, and Constantine appealed in vain to the princes of Christendom. A long siege preceded the capture of the city, which was finally accomplished May 29, 1453. In the desperate battle waged at the gates of the city Constantine fell, slain by some unknown hand. Consult Mijatovitch, *Constantine, the Last Emperor of the Greeks* (London, 1892), and Pears, *Destruction of the Greek Empire* (ib., 1903). See BYZANTINE EMPIRE.

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rounded by partly ruined walls, the most famous of which is the Theodosian double wall dating from 447. The fortifications are flanked by towers and are pierced by numerous historic gates. The streets are crooked and often without sidewalks. There are countless house gardens and many beautiful cemeteries. The houses, usually two-storied, are mostly built of wood, though some portions of the city, since the great fires of 1865, 1866, 1870, and 1909, have been reconstructed in a modern fireproof style.

Constantinople has always been celebrated for the large number and the beauty of its churches. These edifices either belong to the Byzantine period subsequently to which they have been converted into mosques, or else they have been built by the Turks after the city had fallen into their hands. St. Sophia (q.v.) is the most famous church in the first category.

The Suleymanieh Mosque covers a site nearly as large as that of St. Sophia and, like most mosques, is surrounded by a well-shaded court. It was built in 1550–66 by Sultan Suleyman. It has four minarets and is surmounted by a dome somewhat higher than that of St. Sophia. The marble decorations in the interior are magnificent. It is an excellent specimen of genuine Turkish architecture. The Ahmedieh Mosque was built in 1609–14, and exceeds in dimensions the Suleymanieh, but is inferior to the latter in design and in ornamentation. Among other mosques may be mentioned those of Mohammed II, Beyazid II, Selim I, Yeni-Jami, and Nuri-Osmani.

Secular buildings of historic interest are: the Castle of the Seven Towers, once a state prison where a number of dethroned sultans were executed; the hippodrome, completed by Constantine, the scene of public festivals as well as of popular uprisings; and the old seraglio, with its extensive gardens and beautiful kiosks and palaces. This ancient residence of the sultans has been transformed into a museum within which some of the most exquisite creations of the genius of Greek paganism and of Mohammedanism are now stored. South of this museum lies the Sublime Porte. This is the seat of government and consists of an assemblage of administrative buildings. It is surrounded by a railing with several gates. The one facing the ancient palace is very elaborate and was used by the sultans when they went to attend a council of their ministers. It was thus that the name "Bab-Ali," or "Sublime Gate," was applied to it, the French version being now universally used.

The bazars of Constantinople are very numerous. The chief of them, the Grand Bazar, somewhat injured by an earthquake in 1894, occupies a large number of narrow, vaulted alleys and contains about 3000 shops. It is filled with Oriental merchandise of great variety and beauty and affords in daytime one of the finest sights of the city. The bazars, however, are gradually losing their importance, the wealthier classes preferring to make their purchases in the European shops on the Grande Rue in Pera, where modern goods can be obtained.

Galata, situated on the east shore of the Golden Horn, is the business port of Constantinople. Its water front is lined with wharves to which steamers are constantly moored. Here are found the warehouses, banking houses, exchanges, and the customhouse. The town is built of stone, and the streets in some sections are new and regular. The Galata Tower, formerly known as the "Tower of Christ," is 150 feet high and is divided into several stories and surrounded by galleries. It serves as a fire-signal station.

Pera, the foreigners' quarter and the most modern part of Constantinople, lies northwest of Galata. Here are the foreign embassies and the residences of the Europeans. Here also is the Grande Rue, lined with fashionable shops and hotels. Pera has a fine park, barracks, and several cemeteries which are occasionally used as festival grounds.

Administration.—As to government, Constantinople, including the suburb of Scutari across the Bosporus, forms a separate district, under the administration of a prefect. The fire department is being organized gradually according to western systems. Systematic street cleaning is attempted only in the European section of the city. The oldest aqueducts of Constantinople date in part from the reigns of Hadrian and Valens and are regarded among the finest remaining specimens of ancient engineering. Their capacity was increased by the Sultans. Some of the cisterns are the largest in the world; the roof of one of them is supported by 336 marble columns. The water comes from the reservoirs of the forest of Belgrade and also from Lake Derkos.

Numerous elementary public schools are attached to the mosques and offer instruction free; as do also the colleges, or "medresses," some 170 in number, with public libraries attached, many of them filled with valuable books and manuscripts. A university was opened in 1900, with faculties of philosophy, Mussulman theology, mathematics, law, and medicine. The Imperial Art School is not without importance. The two most important educational institutions are the "Lycée Impérial" and Robert College. The last named is an American institution, founded in 1863. The "Great National School" of the Greek dates from the Byzantine period and supplies many teachers for the Greek schools in Turkey. The French conduct several schools for the children of the wealthier classes. Benevolent institutions are numerous.

The industrial importance of Constantinople is not great. The few large establishments manufacture tobacco products, fezzes, and iron wares. The handmade products, on the contrary, are important, both as regards variety and quantity; and to the trade in these small articles the life of the city lends itself most interestingly, with its bursting little shops, its noisy street traffic before the mosques, and its curious and picturesque trade customs. The geographical position and natural harbor facilities of Constantinople are unsurpassed. The Golden Horn affords accommodation for over 1000 vessels of the heaviest draft. It is divided by its two bridges into the outer and inner ports of trade and the port of war.

Not until 1888 did the city have railway connection with the rest of the world. Since the establishment of direct steam communication between Persia, Syria, Arabia, and southern Europe, and the opening up of Central Asia by Russia, Constantinople has lost a considerable part of its commerce. Important imports are food products, textiles, coal, metal ware, instruments and implements of all kinds, petroleum,

and wood. The exports are largely confined to carpets and rugs, lambskins and wool, attar of roses, embroideries, and filigree work. The entrances and clearances of shipping during 1910 comprised 20,268 vessels, with a tonnage of 19,154,000. For local transportation there are omnibuses, horse-car and electric lines. An underground cable road connects Galata and Pera. Small steamers and ferries ply in the Golden Horn between Stambol and Galata. Excellent passenger service between the city proper and the suburbs in the Bosporus is afforded by splendidly equipped ferries.

The population of Constantinople proper is estimated at about 942,000. This figure is increased to over 1,200,000 by including the suburbs. In the city proper nearly two-thirds of the population are Mohammedans.

History.—The city was founded in the sixth century B.C. by Greek adventurers. Owing to the advantages of its site, the settlement prospered rapidly. Its possession was the aim of the leading nations. In 330 A.D. the Roman Emperor Constantine the Great adopted the city as his capital in preference to Rome and gave it the name "Constantinople." The presence of the Emperor made Constantinople from the first distinctively the capital of the Greek civilization in the eastern part of the Roman Empire, as Rome remained the head of the Latin civilization in the West. From 395 to 1453 the city was the capital of the Byzantine or Eastern Empire. The Patriarch of Constantinople gradually rose to the position of head of the Christian Church in the East. In the course of years, as the Imperial provinces in Asia and Africa, with the great metropolises of Antioch and Alexandria, fell into the hands of the Mohammedans, the Christian culture of the East found refuge in Constantinople, and Byzantinism—a blending of the ideas of Oriental despotism with the Roman conception of the state—found its home there. In the struggle between Latin and Greek Christianity Constantinople naturally was the great opponent of Rome, and, as the champion of inflexible orthodoxy, it welcomed the great schism of 1054, which broke up the Catholic church. The strategic position of the city at the meeting place of two continents exposed it to attacks from numerous nations—Avars, Arabs, Bulgars, Varangians, the Latin powers of western Europe, and finally the Turks. It was besieged frequently, and its walls were repeatedly assaulted; but it was taken thrice only—by the Crusaders in 1203 and 1204, and by Mohammed II, after a memorable siege, on May 29, 1453. The prosperity of the city sank during the period of the Crusades, when its lucrative commerce was diverted to the Italian towns. In 1204 it was captured and sacked by the Crusaders, who established the Latin Empire of Constantinople; but this lasted only until 1261, when the Greeks regained the city. Its capture by the Turks marks an epoch in European history. In more recent times Constantinople has been important as a storm centre in the play of international politics known as the "Eastern Question." In 1878 the Russian armies advanced to the fortifications of the city and occupied the suburb of San Stefano. See BALKAN WAR.

Consult: Grosvenor, *Constantinople* (2 vols., Boston, 1895); Van Milligan, *Byzantine Constantinople* (London, 1899); Pears, *Fall of Constantinople* (New York, 1886); *The Destruction of the Greek Empire* (London, 1903); Djelal Essad, *Constantinople, De Byzance à Stamboul* (Paris, 1909); Hutton, *Constantinople* (London, 1904); Dwight, *Constantinople and its Problems* (New York, 1901); Barth, *Konstantinopel* (Leipzig, 1901).

CONSTANTINOPLE, COUNCILS OF. Eight councils which are recognized as ecumenical by either the Greek or Latin church, or by both, were held at the city of Constantinople. The *first* was the second ecumenical council of the Church, convened in 381 by the Emperor Theodosius I. It consisted of 150 bishops, chosen under the dictation of the Emperor and chiefly from the East, besides 36 semi-Arian bishops, followers of Macedonius of Constantinople, who withdrew after their opinions had been condemned. This council condemned also the Arians, Eunomians, and Eudoxians; it reaffirmed the resolutions of the Council of Nice, completed the definition by that council of the divinity of the Holy Ghost, and declared that the Bishop of Constantinople, or new Rome, was, of right, next in rank to the Bishop of old Rome; both of them being alike subject only to the Emperor. The *second* was the fifth ecumenical council of the Church, convened in 553 by Justinian I to sustain his condemnation of three distinguished teachers of the Antiochian school, viz., Theodore of Mopsuestia, Theodoret of Cyprus, and Ibas of Edessa, whose opinions had been collected into "three chapters." (See CHAPTERS, THE THREE.) There were 165 bishops, all Eastern except six, in attendance. They condemned the "three chapters" and renewed the condemnation of the doctrines of Nestorius. Pope Vigilius, though not present, afterward sanctioned the condemnations. The *third* was the sixth ecumenical council, held in 680–81. Through the influence of the Roman legates the council condemned the doctrine that, "as there was only one Christ, so He had only one will," and recognized in Him, consistently with the doctrine of two natures in one person, two wills made one by the moral subordination of the human to the divine. The *fourth* was the council held in 692, by command of Justinian II. It is recognized as ecumenical only by the Greeks, and is called *quinisextum*, because it supplemented the fifth and sixth. It passed more than 100 canons concerning the morals of the clergy and Church discipline. The *fifth* was held in 754, and was attended by 338 bishops. It is recognized only by the Greeks and is called "the Mock Synod" by Hefele. It issued a decree against image worship, which was revoked in 787 by the second ecumenical Council of Nice. The *sixth* was held in 869–870 and is recognized only by the Latin church. It was attended by about 100 bishops. It deposed the Patriarch Photius, restored Ignatius, and enacted laws concerning Church discipline. The *seventh* was held in 879 and is called by the Greeks the eighth ecumenical. There were 383 bishops present. It recalled Photius, repealed the action of the preceding council against him, and defined the position of the Patriarch of Constantinople in relation to the Pope. The *eighth* was held in 1341 and is called by the Greeks the ninth ecumenical. It condemned Barlaam, an educated monk, as heretical in opposing the Hesychasts, a mystical sect among the monks of Mount Athos, who asserted the possibility of attaining, while yet in the

body, an intuition of the divine light and essence by a perfect cessation of corporeal life.

CONSTANTIUS I, kŏn-stăn'shĭ-ŭs, FLAVIUS VALERIUS. A Roman Emperor (305–306 A.D.), commonly known as *Chlorus*. He was adopted as Cæsar in 292 by Maximian and received the government of Gaul. When Diocletian and Maximian abdicated the throne, May 1, 305, Constantius and Galerius became emperors respectively of the West and the East. Constantius died at Eboracum (York), in Britain, July, 306, and was succeeded by his son, Constantine the Great. He was distinguished alike for his intrepidity as a soldier and for his ability and humanity as a ruler. See CONSTANTINE I.

CONSTANTIUS II, FLAVIUS JULIUS. A Roman Emperor (337–361 A.D.). He was, by Fausta, the second son of Constantine the Great, and was born at Sirmium (Illyricum), 317. Constantine made him Cæsar in 333, and in 335 appointed him ruler in the East, where, after 337, he reigned as Emperor. Often involved with the Persians, he suffered at their hands a galling defeat in 348. His brother Constans being murdered by Magnentius, he met the latter in battle at Mursa and punished him so grievously that he subsequently perished by his own hand. Constantius now reigned alone over the whole Empire. He made his cousin, the apostate Julian, Cæsar in Gaul and bestowed upon him the hand of his sister, Helena. When, however, Julian achieved great glory, Constantius became jealous and demanded the relinquishment of many troops. With this order Julian was disposed to comply, but his admiring soldiers refused to leave him. Constantius then proceeded against him, but died of fever before an engagement, whereupon Julian, previously proclaimed, succeeded to the title. As a ruler, Constantius was severe and oppressive. Consult *The Cambridge Mediæval History,* vol. i (New York, 1911).

CON'STANTS OF NATURE. A term applied to various unchangeable quantities that are found to be characteristic of natural phenomena or relations. The propagation of light through space takes place invariably at the rate of 186,770 miles per second, and hence the velocity of light may be referred to as a constant of nature. The period of rotation of the earth on its axis may be considered as another constant of nature, although, strictly speaking, it is subject to slight variation. The atomic weights of chemistry, i.e., the smallest relative combining weights of the elements, furnish another example of important constants of nature —important because they permit of expressing the composition and reactions of all substances in a simple and useful form. The electrolytic equivalents, i.e., the weights of elements deposited in the electrolysis of their compounds by a unit current in one second, are likewise constants characteristic of the several chemical elements.

In choosing the units of precise measurement, which form the basis of all calculations in pure and applied science, it is necessary in certain cases to employ the constant quantities of nature. For example, the second, which is the unit of time generally used at present, is defined in terms of the time of a complete revolution of the earth on its axis. As thus defined, however, the unit is not quite perfect; the time of a revolution of the earth on its axis is subject to slow variation, and hence the duration of the second, referred to that time, must likewise be slowly changing. But, taking the average for a year of the times of rotation of the earth, i.e., obtaining "the mean solar day," it is found that this remains unchanged from year to year so far as is known. Ordinary chronometers and clocks are so rated as to give this time. With a view to establishing a more perfect unit of time, scientists have proposed to adopt as its basal constant of nature the period of vibration of an atom emitting light of a given wave length—an interval of time that is believed to be absolutely constant, provided the conditions of excitation of the light remain unchanged.

The laws of science are generally expressed in the form of mathematical equations whose numbers and terms represent the constant as well as the variable factors of typical natural phenomena. Thus, the variation of volume under variable conditions of temperature and pressure, which is characteristic of all bodies, is in the case of perfect gases subject to laws that are usually expressed by the equation $PV = RMT$ in which P stands for pressure, V for volume, T for the absolute temperature (i.e., $t°$ centigrade + 273), R is a constant for any *one* gas, and M is the mass. If, in experimenting with different gases, we should employ such quantities of them as would, under the same conditions of pressure and temperature, occupy equal volumes,—i.e., if the mass of the gas is numerically equal to the "molecular weight" of the gas,—we would find that while the pressure and temperature might subsequently be changed, the ratio of the product PV to T, i.e., the product Rx "molecular weight," would remain constant and the same for all gases, irrespective of their chemical nature; i.e., the product of the pressure and volume (PV), divided by the absolute temperature (T), would yield invariably the same number. That number, called "the gas constant," is therefore obviously characteristic of the interdependence of pressure, volume, and temperature in all gaseous matter; and, being so general, it has great importance in both pure and applied science. Thus, the constants of nature characterize natural phenomena and enter into all the mathematical laws of science.

Consult: Lupton, Everett, *C. G. S. System of Units* (London, 1902), Landolt and Börnstein, *Physikalisch-chemische Tabellen* (4th ed., Berlin, 1912); Clarke, *The Constants of Nature* (5 parts, Smithsonian Miscellaneous Collections, Washington, 1873–88). Some of the constants of nature may of course be found in any scientific textbook. See also CALCULUS; C. G. S. SYSTEM.

CON'STELLA'TION (Lat. *constellatio,* from *com-,* together + *stella,* star, Gk. *ἀστήρ, astēr,* Skt. *star,* Ar. *stare,* OHG. *sterno, sterro,* Ger. *Stern,* AS., Eng. *star*). A group of stars. From a time earlier than authentic records can trace, the stars have been formed into artificial groups, which have received names borrowed from fancy or fable. These groups are called "constellations." Though quite devoid of anything like systematic arrangement, this traditional grouping is found a sufficiently convenient classification and still remains the basis of nomenclature for the stars among astronomers. Before the invention of almanacs the risings and settings of the constellations were looked to by husbandmen, shepherds, and seafaring men as the great landmarks of the seasons, and consequently of the weather which each season

was expected to bring with it (see Job xxxviii. 31); and it is not surprising if the storms or calm weather that usually accompanied such seasons were connected, in the popular imagination, with the influence of the stars themselves, or the beings with whom superstition or fable identified them. Thus, the risings and settings of Boötes with the bright star Arcturus, which took place near the equinoxes, portended great tempests. (See Vergil's *Georgics*, i, 204.) The great heat in July was ascribed to the rising of Canis Major, the Great Dog, with its bright star Sirius. (See CANICULA; HELIACAL RISING.) The appearance of the twins, Castor and Pollux, was hailed as the harbinger of fair summer weather.

Almost all nations have, from early times, arranged the stars into constellations, but it is chiefly from the nomenclature of the Greeks and Romans that our own is derived. Eudoxus (c.370 B.C.), a contemporary of Plato, gave a description of the face of the heavens, containing the names and characters of all the constellations recognized in his time. Though this production is lost, a poetical paraphrase of it, entitled *Phænomena*, written about a century later by Aratus (q.v.), is still extant. This poem describes 12 zodiacal constellations (see ZODIAC), with 20 situated to the north and 13 to the south of the ecliptic (q.v.). The next enumeration occurs in the *Almagest* of Ptolemy, and includes the preceding, with three additional, one northern and two southern, constellations, making in all 48. The names of these ancient constellations are: north of the ecliptic, *Andromeda, *Aquila, *Auriga, *Boötes, *Cassiopeia, *Cepheus, *Corona Borealis, *Cygnus, Delphinus, *Draco, *Equuleus, *Hercules, *Lyra, *Ophiuchus, *Pegasus, *Perseus, Sagitta, Serpens, Triangulum, *Ursa Major, *Ursa Minor; in the Zodiac, *Aries, *Taurus, *Gemini, *Cancer, *Leo, *Virgo, *Libra, *Scorpio, *Sagittarius, *Capricornus, *Aquarius, *Pisces; south of the ecliptic, Ara, *Argo, *Canis Major, *Canis Minor, *Centaurus, *Cetus, *Corona Australis, Corvus, Crater, *Eridanus, Hydra, Lepus, Lupus, *Orion, Piscis Australis. Large accessions have been made to the nomenclature in modern times partly in consequence of maritime discovery having made us acquainted with constellations in the Southern Hemisphere which never rose upon the world known to our ancient authors, and partly through the subdivision of some of the larger of the ancient constellations into smaller groups. Among those who were chiefly instrumental in forming new constellations may be mentioned Petrus Theodorus (d. 1596), Johann Bayer (1572–1625), Jakob Bartsch (1600–33), Johann Hevel, or Hevelius (1611–87), and Nicolas Louis Lacaille (1713-62). In 1751 Lacaille went to the Cape of Good Hope for the purpose of making a catalogue of the southern stars, and forming them into constellations —an undertaking which he prosecuted with great ardor for nearly four years, at the expense of the French government. In 1840, a committee, consisting of Sir John Herschel, Dr. Whewell, and Francis W. Baily, was appointed by the British Association for the purpose of defining the constellations and settling their boundaries. Largely as a result of their recommendations, 87 constellations are now accepted as authoritative. These include the 48 Ptolemaic constellations: Apus, *Camelopardus, *Chamæleon, Columba, *Coma Berenices, *Crux, Dorado, Grus, Hydrus, Indus, *Monoceros, Musca, Pavo, Phœnix, Piscis Volans, Toucan, and Triangulum Australe, formed by Bartsch and others before the middle of the seventeenth century; *Canes Venatici, Lacerta, Leo Minor, Lynx, *Scutum Sobieski, Sextans, and *Vulpecula, described by Hevelius in 1690; *Antlia, Cœlum, Circinus, Fornax, Horologium, Microscopium, Mensa, Norma, Octans, Pictor, Reticulum, Sculptor, and Telescopium, contributed by Lacaille in 1753; and finally, Carina, Puppis, and Vela, formed by the British Association committee, and replacing the ancient constellation Argo, out of which they were carved. The chief constellations are indicated by an asterisk, and will be noticed under their several names. Early in the seventeenth century, Julius Schiller, the friend of Bayer, attempted to reform the nomenclature of the constellations, replacing the old pagan names by others drawn from Christian sources. Thus, the zodiacal constellations received the names of the twelve Apostles, and Perseus, Hercules, Cassiopeia, Pegasus, Canis Major, Centaurus, and Auriga, became the Apostle Paul, the Three Kings from the East, Mary Magdalen, the Archangel Gabriel, King David, the Patriarch Abraham, and St. Jerome respectively, but the changes failed to meet with acceptance. The fanciful figures from which the constellations are named are depicted on celestial globes and maps of the heavens.

In the older writers upon astrology, constellation signifies the relative positions of the planets at a given moment. See ASPECT.

Consult: Wölf, *Geschichte der Astronomie* (Munich, 1877); Plunket, *Ancient Calendars and Constellations* (London, 1903); Young, *Uranography*, a supplement to *Elements of Astronomy* (New York, 1909).

CONSTELLATION. A famous United States vessel, built in 1798, which, as the flagship of Commodor Truxton, captured the French frigate *Insurgente* in 1799, and in 1800 won a brilliant victory over the superior French frigate *La Vengeance*.

CON'STIPA'TION (Lat. *constipatio*, from *constipare*, to crowd together, from *com-*, together + *stipare*, to crowd, from *stipes*, stem). Abnormal retention in the intestines of fecal matter, or its passage in abnormally hard masses. Normally the bowels of an infant should "move" or be emptied from two to five times in 24 hours; the bowels of an adult once in 24 hours. The causes of constipation are imperfect digestion (due to deficient secretion in the alimentary canal, inaction of the liver, or insufficient contraction of the muscular fibres of the intestine), insufficient exercise, the use of alcohol or drugs, or improper food. Congenital or acquired strictures of the bowel, fibrous bands following intra-abdominal operations or inflammations, lax abdominal walls with a general prolapse of the abdominal contents (enteroptosis), are also frequent causes. Symptoms may be entirely absent, but commonly there are lassitude, dull headache, and mental depression, together with failing appetite and furred tongue. In obstinate cases acute obstruction of the colon may occur, or ulceration of the colon, or even perforation. Hemorrhoids are not an unusual result of chronic constipation. The treatment of constipation may be dietetic, hygienic, and medicinal. The diet should be largely vegetable, with whole-wheat bread, cereals, fruit, and an increase of fats and water, with little

meat, no alcoholic beverages, and little sugar. A daily cold sponge bath, regular out-of-door exercise, and circular massage of the abdomen in the direction of the passage of the intestinal contents, relieve many cases. In other cases enemas or cathartic medicines may be necessary. See CATHARTIC.

Lower Animals. Constipation in the lower animals depends, as in man, on imperfect secretion from, or motion of, the intestinal walls. In the horse it is usually accompanied by colic (q.v.), and when long continued leads to enteritis (q.v.). The appropriate remedies are soap and water clysters, given every two hours; smart friction and cloths wrung out of hot water applied to the abdomen, with three drachms of aloes and one of calomel, given in gruel, and repeated in 16 hours if no effect is produced. Give, besides, walking exercise; restrict the amount of dry solid food, but allow plenty of thin gruel or other fluids, which may be rendered more laxative by admixture with treacle or a little salt. Similar treatment is called for in dogs, cats, and pigs. In cattle and sheep digestion principally takes place in the large and quadrisected stomach; the bowels, accordingly, are little liable to derangement; and constipation, when occurring in these animals, generally depends upon impaction of dry hard food between the leaves of the manyplies, third stomach, or fardel bag. The animal is hence said to be *fardel bound.* The complaint results from the eating of tough and indigestible food, such as ripe vetches, rye grass, or clover; it prevails in dry seasons, and on pastures where the herbage is coarse and the water scarce. It occurs among cattle partaking freely of hedge cuttings or shoots of trees, hence its synonym of *wood evil.* From continuous cramming and want of exercise, it is frequent in stall-feeding animals, while from the drying up of the natural secretions it accompanies most febrile and inflammatory diseases. The milder cases constitute the ordinary form of indigestion in ruminants, are accompanied by what the cow man terms *loss of cud,* and usually yield to a dose of salts given with an ounce or two of ginger. In more protracted cases rumination is suspended, appetite is gone, constipation and fever are present. There is a grunt noticeable especially when the animal is moved, and different from that accompanying chest complaints, by its occurrence at the commencement of expiration. By pressing the closed fist upward and forward beneath the short ribs on the right side, the round, hard, distended stomach may be felt. This condition may continue for 10 days or a fortnight, when the animal, if unrelieved, becomes nauseated and sinks. Stupor sometimes precedes death, while in some seasons and localities most of the bad cases are accompanied by excitement and frenzy. In this, as in other respects, the disease closely corresponds with stomach staggers in the horse. *Treatment.*—Give purgatives in large doses, combining several together, and exhibiting them with stimulants in plenty of fluid: For a medium-sized ox or cow, use three-quarters of a pound each of common and Epsom salts, 10 croton beans, and a drachm of calomel, with three ounces of turpentine, and administer this in half a gallon of water. If no effect is produced in 20 hours, repeat the dose. Withhold all solid food; encourage the animal to drink gruel, soft bran mashes, molasses and water; and give exercise, enemata, and occasional hot fomentations to the belly.

CONSTITUENT ASSEMBLY. See ASSEMBLY, NATIONAL.

CON'STITU'TION (Lat. *constitutio,* a settlement of a controversy; then a decree; from *constituere,* to cause to stand, to establish, from *con-* + *statuere,* to erect, to establish). Formerly used of any law promulgated by sovereign authority. In the Roman Empire the Imperial legislation, decreed and put into effect by the will of the Emperor, was comprehensively described by the term *constitutiones.* These included *rescripts,* or answers to petitions; *mandates,* or instructions to officials, administrative and judicial; *decrees,* or judgments on causes brought before him, directly or on appeal; and *edicts,* or general proclamations. See CIVIL LAW.

So, in early English law, *constitution* signified any statute, though it was not commonly employed except with reference to certain important legislation affecting the relations of the state and the church. Thus, the Constitutions of Clarendon were laws enacted in the reign of Henry II at a Parliament held at Clarendon in 1164, restricting the power of the clergy, limiting the right of appeal to the Pope, and virtually making the King the supreme head of the church in England.

At the present time, however, the term is used in the more restricted sense of the fundamental law of a state, society, or corporation, public or private. More specifically, the constitution of a state or society is the body of legal rules by which it is organized and governed, and which determines its legal relations to other states and societies and to its own members. This constitution may be created by the political or other body whose powers it defines and regulates, or by the individuals composing it and from whom its powers are derived, or it may be the creation of an external authority to which it is subject. Examples of the last form of constitution are afforded by the case of the ordinary private corporation, whose fundamental law is prescribed by the state to which it owes its existence; by municipal corporations, such as cities and villages, which derive their authority from their charters of incorporation and from the municipal law of the state to which they belong; and by subject states, territories, or colonies, whose constitutions are to be looked for in the legislation of the parent or sovereign state. The constitutions of Canada, of Hawaii, of Porto Rico, and to a certain extent that of the Republic of Cuba, belong to this class—the act of the American Congress, under the authority and the limitations of which the Cuban constitution was recently enacted, being in effect a part thereof.

Examples of the second form of fundamental law exist, in the political sphere, in popular constitutions like those of the United States, of the several States of the American Union, of the French Republic, and of Switzerland; and, in the domain of private law, by the rules adopted by the stockholders of corporations and voluntary associations for the conduct of their affairs by their boards of directors and other officers.

The first type of constitution, in which the fundamental law is the creation of the powers wielding the sovereign authority of the state, is to be found in all of the monarchical states of

Europe which have adopted, in whole or in part, a constitutional form of government. The free constitution of England, so popular in character and so largely the product of custom, in a strict legal sense, belongs in this category as clearly as does the government of Russia, which became at least nominally constitutional in 1905 by Imperial decree. To this class also we must refer the constitution of the Roman Empire, as well as of the Republic, and of the free commonwealths of ancient Greece. It is to this form of constitution, because it is alterable by the ordinary legislative authority of the state, that Viscount Bryce applies the term "flexible," while constitutions of the second and third classes, which are superior to the ordinary law-making power and not capable of amendment except by the higher authority which created them, he describes as "rigid" constitutions.

It is obvious that the authority of a self-imposed constitution differs widely from that of a true fundamental law, which underlies the ordinary processes of government and by which a political society has chosen to limit or has been constrained to restrict its governmental agencies. In a legal sense, therefore, the real distinction between constitutions does not turn upon the ease or difficulty with which they can be altered, nor yet upon the fact that the established process for amending a constitutional provision differs from the ordinary processes of legislation, but in the fact that a constitution of the one type is a part of the ordinary law of the land, and that a constitution of the other type is superior to the ordinary law; that in the one case legislation is irresponsible and uncontrollable, while in the other it is controlled by the fundamental law. In a state having a constitution of the one sort, we shall expect to find a court or other independent representative of the sovereign power from which the constitution was derived, which shall protect it from encroachments on the part of the ordinary law-making power; in a state of the other sort, we shall look to see the governing authority of the state unfettered by any external authority—itself the supreme representative of the sovereignty of the state.

Ordinary Constitutions.— The constitution of Great Britain affords the best modern example of the nature and operation of an *ordinary* constitution; that of the United States, the best example of an *extraordinary*, or *supreme*, constitution. The British constitution is an indefinite body of legal rules and principles, partly customary, partly the result of judicial decisions, and partly made up of acts of Parliament. These are nowhere collected in one place, but must be extracted from the whole body of the common and statute law of the realm and from observation of the workings of the government. Any act of Parliament and any judicial decision may modify it, and not infrequently statutes have been passed which have contained both constitutional and ordinary legislation mingled together in one and the same paragraph. Not only is there no authoritative statement of the British constitution to be found, but, from its very nature, no such statement could be made. So much of it depends upon custom and so much is left to time and circumstance that the most precise definition of its terms would be the most misleading. No law, statutory or judicial, has created the cabinet, to which, as the executive committee of the House of Commons, the government of the Empire is at present committed; but whether it is really the cabinet, or a committee of the cabinet, or the Prime Minister, that governs England, is so much a question of personality and of circumstances that it defies answer. So no one can say whether the crown still retains the ancient prerogative of vetoing an act of Parliament. It is commonly assumed that the power is extinct. The only safe statement that could be made, however, would be that the right has not been exercised for nearly 200 years, and that only a grave emergency would justify the sovereign in employing it; and if this should occur, there is no lawful process by which the act, however repugnant to current ideas of government in England, could be declared unconstitutional or deprived of its legal effect. Under such a system the constitution would sanction any governmental act which could be performed without precipitating a revolution.

The latest English writers distinguish between the *law* and the *custom* of the constitution—the former having reference to certain statutory provisions (such as the act settling the succession to the crown, the bill of rights, etc.) which, being laws in the strictest sense of the term and tending to limit the authority of a single branch of the government and not the supremacy of Parliament, are capable of enforcement by the courts; and the latter, to the great body of customary rules and observances which in practice control the working of the government and the distribution of its powers, but are enforced only by public opinion and by respect for the settled order of the constitution. The latter are not true laws, as they lack the sanction of any legal authority to declare and enforce them. In the field of ordinary jurisprudence no such distinction as this can be drawn between custom and law. There custom *is* law and will be enforced as such. But the case is manifestly different in the sphere of constitutional law, for there a custom tending to restrict the action of the sovereign power can find no jurisdiction to enforce it.

A constitution of the ordinary legal type may belong to either of the two old categories of "written" and "unwritten" constitutions—an unwritten constitution being one which is wholly or largely based on custom or judicial decisions, and a written constitution being the result of a specific act of legislation and having the definite form and the certainty of a body of statute law. But the distinction, though sound enough, is of no practical importance, as no considerations of political philosophy or of legal validity are involved in it. In fact, every political constitution is a composite of common and statute law, of custom and legislation, and the validity of its several provisions is not in the least dependent upon the manner in which the principles which they embody have acquired the form and content of legal authority. The British constitution, e.g., is much more than a body of customary law. At least five important sources of the rules and principles which it embodies may be distinguished. These are: 1. Two principal treaties, the Act of Union with Scotland in 1707 and the Act of Union with Ireland in 1800. 2. Certain great "compacts," viz., Magna Charta in 1215, the Declaration of Right in 1689, and the Act of Settlement in 1701. 3. A large number of public acts of Parliament, ranging from matters of the greatest

to those of the least political importance. 4. The body of precedents and customs known as the common law. 5. The usages and practices known specifically as the customs of the constitution, which are in reality the mass of practical expedients and understandings by which government is mainly carried on. To these last we have denied the character of law, partly because of their indefiniteness and fluctuation, but more particularly because of their lack of a legal sanction. The fourth class consists of legal rules in the proper sense of the term, but of the sort contemplated by the use of the word "unwritten"; but nevertheless, if formal treaties and acts of Parliament are written law, then is the British constitution, in part at least, a written constitution. Some constitutions of the ordinary type, however, are of the strictly "written" sort, being the result of a single legislative act or a grant of power from the sovereign head of the state. Most of the constitutions which have been promulgated in the several states of continental Europe, as well as that of Japan, are of this character. They have the common characteristic of the lack of any superior sanction. A law enacted by the ordinary legislative authority and promulgated by the supreme executive power of the state is a law, whether sanctioned by the constitution or not. In other words, a law may be unconstitutional and yet valid.

Extraordinary Constitutions.—As the polity of the British Empire furnishes the best example of the ordinary, "flexible," and unwritten constitution, so does the fundamental law of the United States exhibit the best and most characteristic constitution of the opposite type —of the extraordinary, or supreme, and "rigid" form. Though the constitutions of the general government and of the several States have very great and even fundamental differences, they are all alike in this respect, that the organic law has a sanction superior to that of the ordinary law of the land; that the Constitution is in fact "the supreme law" to which the ordinary law must conform; that the sovereignty is not wholly committed to the ordinary agencies of government, but the power of these is limited, and that this limitation on legislative and executive action is not a mere form of words, but is rendered effective by the power vested in the courts of annulling acts of government in contravention of the supreme law. The Federal government and the governments of the States are, therefore, not sovereign, but legally limited corporations, strictly analogous to private and minor municipal corporations, which derive a limited authority from the State which created them. There is nothing singular in the power exercised by the courts in declaring a corporate act invalid because of its transcending the legal authority of the body performing it, even in the political sphere. It is plain that the political action of a colony, even of the "self-governing" type, and of dependent States, as well as of cities and towns, is subject to control by the dominant political authority. The British Parliament and the English courts exercised this authority over the American Colonies as they now exercise it over Canada, Australia, and South Africa. The novelty of the American system consists in the application of this familiar principle to independent and sovereign States. The right of the Supreme Court of the United States, and even of the ordinary Federal tribunals, to pass upon the validity of acts of the national Congress was long disputed, but it was asserted by the Supreme Court as early as 1797, and actually exercised in the celebrated case of Marbury *v.* Madison in 1803. This conclusion was so plainly sound, and so obviously necessary to the working of the American constitutional scheme, that it has been generally acquiesced in. Several of the State courts had in the meantime reached a similar decision as to their authority to nullify acts of their own legislatures when in conflict with the local constitution or with that of the United States, and the principle may now be regarded as an essential part of the constitutional system of the United States. See SUPREME COURT OF THE UNITED STATES.

There is one important difference between the fundamental law of the United States and that of the several States. The national government being a federal union of independent commonwealths—some of them existing before its formation and others having come into the Union as independent States—the national Constitution is simply a grant of powers from the latter to the former, while the State constitutions are merely limitations upon the power of the ordinary agencies of government of the States. From this it follows that the Federal government has no powers excepting such as are conferred by the Constitution to which it owes its existence, while the State governments, on the contrary, have vested in them the full sovereignty of the commonwealth, excepting as this is limited by the local constitution and that of the United States. The function of the courts of the United States and of the several States in interpreting their respective constitutions is very different therefore. An act of Congress is invalid if it transcends the powers conferred upon the legislative branch of the government by the fundamental law; whereas, an act of the Legislature can be impeached for unconstitutionality only if it is in contravention of the limits placed by the Constitution on legislative power.

In general, constitutions may be amended, altered, or abrogated by the same power which created them, or by a process provided in the fundamental law for that purpose. A constitution which is the free gift of the sovereign authority may be recalled or nullified by the authority that conferred it. A rigid constitution of the American type, which is the creation of the people, and which cannot be directly changed without their concurrence, has in practice been found to be of the most inflexible kind. For a period of more than 60 years after the adoption in 1803 of the Twelfth Amendment (relative to the election of President and Vice President) the Constitution of the United States did not suffer a single amendment, and the three amendments adopted at the close of the Civil War, and as the result thereof, and the two recent amendments (1913) empowering the Congress to enact an income tax and providing for the election of United States Senators by popular vote, have been the only changes which it has since sustained. Like the English constitution, however, it has changed greatly, though imperceptibly, by the insidious processes of custom and of judicial interpretation. The history and language of the instrument, and the nature of the changes which it has undergone, will be set forth in the article on the CONSTITUTION OF

THE UNITED STATES. See also GOVERNMENT; STATE; SOVEREIGNTY; GREAT BRITAIN; and the titles of other States concerning whose constitutions information is sought.

Consult: Bryce, *The American Commonwealth* (4th ed., London and New York, 1913) and *Studies in History and Jurisprudence* (London and New York, 1901); Burgess, *Political Science and Comparative Constitutional Law* (Boston, 1900); Anson, *Law and Custom of the Constitution*, part i (7th ed., Oxford, 1893), part ii (2d ed., 1896); Dicey, *Lectures Introductory to the Study of the Law of the English Constitution* (4th ed., London, 1893); Bagehot, *The English Constitution* (new ed., London, 1896); McClain, *Constitutional Law in the United States* (New York, 1905); Cooley, *Treatise on the Constitutional Limitations which Rest upon the Legislative Power of the States* (Boston). Consult also the historical works referred to under the various titles UNITED STATES; GREAT BRITAIN, ETC.

CONSTITUTION, CHEMICAL. See CHEMISTRY; CARBON COMPOUNDS; STEREOCHEMISTRY.

CONSTITUTION, THE. A 44-gun frigate, the most famous vessel in the history of the United States navy, sometimes called "Old Ironsides," from the hardness of her planking and timbers. She was launched on Oct. 21, 1797, but was not completed and equipped until the following year, when she put to sea under Captain Nicholson for service against the French. During the war with Tripoli, 1801–05 (see BARBARY POWERS, WARS WITH), she was Preble's flagship and in 1805 took part in three of the five bombardments of the port of Tripoli. In July, 1812, in command of Isaac Hull (q.v.), she escaped from a British squadron off the New Jersey coast, after a spirited chase of three days, and on August 19, off Cape Race, fought her famous battle with the *Guerrière*, Captain Dacres, a somewhat weaker English frigate, which she left a total wreck after an engagement of 30 minutes, the English losing 79 of their crew, the Americans 14. On December 29, under the command of Captain Bainbridge, she captured off Bahía, Brazil, the *Java* (38 guns, Captain Lambert), after a two hours' engagement, in which the British lost 300 in killed and wounded, the Americans 34. On Feb. 14, 1814, under Captain Stewart, she captured the *Picton*, 16 guns, and a convoy, in the West Indies, and on Feb. 20, 1815, she took the *Cyane*, 34 guns, and the *Levant*, 18 guns, after a fierce engagement—remarkable for the seamanship of the Americans and the gallantry of the English—between the Madeira Islands and Gibraltar. The English lost 19 killed and 42 wounded out of 320; the Americans, 6 killed and 9 wounded out of 451. Soon afterward the *Constitution* was closely pursued by a British squadron, which recaptured the *Levant*. Reported unseaworthy between 1828 and 1830, she was ordered to be dismantled, but was retained in deference to the popular sentiment aroused by Holmes's poem "Old Ironsides" and in 1833 was rebuilt. She went out of commission in 1855 at Portsmouth, N. H., was subsequently used as a training ship, was again partially rebuilt in 1877, crossed the Atlantic for the last time in 1878, and was stored at the Boston Navy Yard in 1897. Consult: Hollis, *The Frigate Constitution* (Boston, 1900); Roosevelt, *The Naval War of 1812* (New York, 1882); Barnes, *Naval Actions of the War of 1812* (ib., 1896).

CON'STITU'TIONAL LAW. In general, that branch of public law which deals with the nature and organization of government, the distribution and mode of exercising the sovereign powers of the state, and the relations of the government to those who are subject to its authority. It has nothing to do with the regulation of the external relations of a state with other states, these being governed by international law, though the agencies for maintaining those relations, and the determination of their character and form, may be included within the constitutional law of the state. Thus, the choice of ambassadors, as well as their rank and functions, being the direct concern of the state they are chosen to represent, is governed by its constitutional law, and so, in the United States, is the power exercised by the Senate in approving, amending, or rejecting treaties with foreign powers.

Again, where the states are not related to one another as independent political communities, but sustain a relation of superior and dependent states, as of a colony to the parent state, or a subject to a dominant state, or of a member of a federation of states to the central authority, such relations are matters not of international, but of constitutional law. Thus, the Acts of Union of England with Scotland and Ireland, the acts of the British Parliament incorporating the Dominion of Canada, the Commonwealth of Australia, and the South African Confederation, the various acts of Congress providing for the government of Porto Rico, Hawaii, and the several Territories of the United States, the provisions of the American Constitution determining the relations between the general government and the individual States—all these are as much a part of the constitutional law of the states affected by them as are their bills of rights, or the laws and customs determining the powers of their respective legislatures.

On the other hand, two political communities may be for some purposes constitutionally related and may yet in some respects remain foreign to one another. Thus, while the relations of the several States of the American commonwealth to the central authority, and, through that authority to one another, are governed by their constitutional law, they are yet for many purposes independent of one another, and, in so far as they are independent, their relations are matters of international and not of constitutional law.

Specifically, the constitutional law of a state consists of its constitution, or so much of it as is legally effective, together with the constructions and interpretations which it has received at the hands of the courts or other competent authority.

British Constitutional Law.—Under a flexible constitution like that of England, which is mainly the result of the accumulated experience of centuries, the principal function of constitutional law is to discriminate between those portions of the constitution which are law, in the strict sense of the term, i.e., which have a legal sanction and will be declared by the courts, and those that rest only upon the customs of the community and upon considerations of practical expediency. These last, which are known as the "custom of the constitution," may have a moral sanction which makes them for the time being as effective politically as the law

of the constitution. But, being legally ineffective, i.e., unenforceable by the authority of the state, they do not, strictly speaking, belong in the category of constitutional law. As a considerable part of the British constitution is made up of such customs and practical expedients, the range of law comprised within it is comparatively narrow. It is to be remembered, however, that though custom, in and by itself considered, is not a part of constitutional law, it may become a source of such law by being adopted by the courts and declared in judicial decisions. More than one of the so-called liberties of the subject in England have thus arisen and now form part of the common law of the land. It is to be observed, also, that in Great Britain constitutional law does not exist as a separate and distinct body of rules and precedents, its provisions being an integral part of the common and statute law of the realm, from which they are to be collected.

American Constitutional Law.—In a state which has a constitution of the "fixed" or statutory type, like the United States, much less is left to convention and understanding, and much less depends upon custom and expediency. The area of law under such a constitution is, therefore, much wider, while the task of the constitutional lawyer is much simpler. The constitutional law of such a state consists of the terms of the constitution itself, with the amendments thereto, and the judicial decisions in which its provisions have come up for construction and application. No acts of the legislature declaring the rights of the citizen, no treaty with a foreign government, no abdication of power by any arm of the state, enters into it. In the American system the only authoritative exposition of a constitution is that furnished by the courts. This extraordinary jurisdiction is not confined to the Supreme Court, but is exercised as well by the inferior Federal courts and by the regular tribunals of the several States. As constitutional law, the judgments of these courts vary according to the constitution whose provisions are under examination. The Supreme Court of the United States is the final authority on the Federal Constitution, and the supreme appellate courts of the several States on the constitutions of their respective States.

It will be borne in mind that the judicial power in the United States extends to acts of Congress and of the legislatures, the Constitution being the supreme law to which all legislation must conform, whereas, the British constitution not being a supreme law, but a part of the ordinary law of the land, the powers of Parliament are not and cannot be limited by it. Accordingly judicial decisions upon the legislative power and its limitations, which constitute the bulk of constitutional law in the United States, are wholly unknown in England.

This, indeed, is the leading principle of American constitutional law—that all acts of government, whether legislative, judicial, or administrative, made or done in contravention of the Constitution, are void. This principle is equally applicable to the constitutions of the several States and to that of the United States. But, the Federal government being one of strictly limited powers, a still more stringent principle is applied to test the validity of its acts, viz., that they are void if not specially sanctioned by the fundamental law. But it does not lie within the competence of the courts to control the action of the State on any other principles than such as are laid down in the fundamental law. They cannot declare void an act within the general competence of the legislative powers, merely because it is contrary to natural justice, or because it violates fundamental principles of republican government, or because of a supposed conflict with the general spirit of the Constitution. It should be added that an act adjudged to be unconstitutional is held to have been void and without legal validity from the time of its enactment.

In the article CONSTITUTION OF THE UNITED STATES (q.v.) reference is made to certain changes which the Constitution of the United States has undergone as the result of judicial interpretation and the slow growth of custom. The former of these is clearly a part of constitutional law, but it is not easy to say how far a particular custom, if threatened with violation, would be supported by the courts. It seems probable, however, that the Supreme Court would not hesitate to recognize a well-established practice of the government as a part of the constitutional law of the land. If, e.g., a presidential elector should at the present time assert his right to disregard the instructions under which he was chosen and cast his vote for the candidate of the opposing party, there is at least a question whether he could not be restrained by the courts from carrying his intention into effect. Consult: Boutmy, *The English Constitution* (London and New York, 1891); Story, *Commentaries on the Constitution of the United States* (5th ed., Boston, 1891); McClain, *Constitutional Law in the United States* (New York, 1905). See CONSTITUTION OF THE UNITED STATES; LAW, PUBLIC LAW.

CONSTITUTIONAL UNION PARTY. A party, formed chiefly out of the remnants of the Know-Nothing and Whig parties, which met in convention at Baltimore in May, 1860, and nominated John Bell (q.v.) and Edward Everett (q.v.) for President and Vice President, respectively, of the United States of America, on a platform which declared simply for "the Constitution of the country, the union of the States, and the enforcement of the laws." The party carried Virginia, Kentucky, and Tennessee, and cast a popular vote of about 600,000, and an electoral vote of 39, in the ensuing election. After this campaign the party virtually went out of existence. It was also known as the "Bell-Everett party."

CONSTITUTION OF ATHENS. The title of a work by Aristotle (q.v.).

CONSTITUTION OF MATTER. See MATTER, PROPERTIES OF.

CONSTITUTION OF THE UNITED STATES. The Federal Constitution of the United States of America is one of the class of "written" and "rigid" constitutions, and the most important example of a constitution of the "supreme" or "extraordinary" type. That is to say, it is not only the result of a definite purpose and of a deliberate act of legislation, embodied in written form; it is not only incapable of modification by ordinary legislative processes; but it is the true supreme law of the land, to which all other law must conform, and conformity to it is the test of the validity of the ordinary law. The commanding quality of the Federal Constitution is the fact that it is not,

like most political constitutions, including those of the several States of the American Union, a mere restriction upon the authority of the governing powers of the state, but that it creates a new frame of government, which it endows with certain limited powers, and from which it deliberately withholds all powers not so granted. The government so constituted by it is, therefore, a government of granted, and not of antecedent, authority, and the Constitution is not only the supreme law of the land, but comprehends within itself the whole of that law.

There is some confusion, therefore, in the use of such phrases as the "territorial extent," "the Constitution follows the flag," and whether the Constitution "applies" to certain newly acquired Territories. Strictly speaking, the Constitution has no territorial extension; it neither expands nor contracts with the limits of American jurisdiction; but, whatever those limits may be, it steadily and invariably binds the governmental agencies of the nation and limits their authority. In so far as it confers general powers of government on the President and Congress, those powers may be exercised in the ends of the earth as well as within the limits of the original States; whereas the restrictions upon that power are equally valid wherever it may be exercised.

This view of the Federal Constitution as a carefully guarded grant of powers to the central government, explains even those guarantees of personal liberty and security which it contains and which are commonly referred to as the Bill of Rights of the Constitution (Amendments I–X). These are not, as they are commonly understood, an unlimited charter of liberties for the people of the United States, but only restrictions upon the exercise of arbitrary power by the President and Congress. They are not aimed at the States or at local authority. It is announced as "a settled rule of construction of the national Constitution, that the limitations it imposes upon the powers of government are in all cases to be understood as limitations upon the government of the Union only, except where the States are expressly mentioned" (Cooley, *Constitutional Limitations*, p. 19). Accordingly, even such a right as that of trial by jury in criminal cases, which is usually regarded as one of the inalienable rights of the American citizen, is by the Federal Constitution protected only against violation by Congress and the Federal judiciary. Excepting as they are restrained by their own constitutions, there is nothing to prevent the several States from abolishing the jury system entirely.

From what has been said above, it will be observed that the Constitution of the United States is not, as it is conceived by foreigners, a complete scheme of government for the people of the United States, but only a part, and that the smaller part, of such a scheme. To fill out the outline, the constitutions and laws of the several States must be taken into account. These provide by far the greater part of the machinery of government, the securities of life, liberty, and property, and the political rights of the citizen.

The Constitution of the United States, in the form in which it is reprinted in this article, represents a long process of experiment and discussion, in the course of which the jealousies and conflicting interests of the different States and sections of which the Union was made up, were gradually compromised and subordinated to the common welfare of all. The Articles of Confederation, by which the ill-jointed union of the 13 original States was held together from 1779 to 1789, can scarcely be described as a constitution, in any proper sense of that term, as they created only the form and not the substance of government, and vested no real authority in the common representatives of the several commonwealths. They were more in the nature of a treaty of alliance, by which the States bound themselves to common action and under which the Congress constituted an international conference for promoting the common welfare. The inconveniences and dangers of this arrangement soon became too pressing to be ignored, and in February, 1787, Congress took such action as its limited powers permitted and passed a resolution, suggesting that a convention of delegates from the several States be held at Philadelphia on the second Monday of May following, "for the sole and express purpose of revising the Articles of Confederation, and reporting to Congress and the several State legislatures such alterations and provisions therein as shall, when agreed to by Congress and confirmed by the States, render the Federal Constitution adequate to the exigencies of government, and the preservation of the Union."

Pursuant to this resolution of Congress, delegates from 12 of the 13 States (Rhode Island alone being unrepresented) assembled at Philadelphia, the convention opening its sessions in Independence Hall on May 14, 1787, under the presidency of George Washington. For four months the delegates carried on the great work which had been intrusted to them, and at the close of their deliberations, on Sept. 17, 1787, they had completed the Constitution of the United States, with the exception of the amendments, in the form in which we have it to-day. Their work was promptly approved by Congress, and at the close of the year 1788 had been adopted by 11 of the States and went into operation among them. The two remaining States, North Carolina and Rhode Island, ratified it and entered into the American Union in 1789 and 1790, respectively.

These results were not achieved without difficulty—in the face of profound differences of opinion. In most of the States the ratification of the Constitution was secured by narrow majorities and after prolonged and earnest discussion, and in none of the States was it approved with anything approaching unanimity. This opposition and these differences of opinion were primarily due to what have been called "the compromises of the Constitution." These were three in number. The first dealt with the fundamental conflict between those who desired a strong central authority and those who feared the extension of executive power. This was compromised by investing the President of the Republic with great powers, but for a limited term only, and by a complicated system of "checks and balances," whereby the exercise of his power was at divers points and in various ways subjected to the control of Congress or of the Senate.

The second compromise was of the conflict of the great and small States, the former claiming the weight in the national government to which their size, wealth, and population entitled them, and the latter insisting upon the recognition of their equality as independent, self-governing commonwealths. This was effected by the institution of two chambers of legislation—a Sen-

ate, in which the States were to have equal representation, and a House of Representatives, in which the representation should be in proportion to population. This compromise involved also the delicate question of the distribution of power between the two houses of Congress.

The third compromise was of the controversy between the upholders of slavery and those who believed that slavery should be restricted or abolished. This was adjusted by the proviso forbidding Congress to prohibit the importation or migration of slaves before the year 1808 (Art. I, Sec. 9), and the requirement that fugitive slaves should be delivered up by the States in which they had taken refuge (Art. IV, Sec. 2). As no power was conferred upon Congress or the President to interfere with slavery in the States in which it existed, the institution was left within the complete control of those States.

In some of the States great dissatisfaction was expressed at the absence of anything like a Bill of Rights in the Constitution, and for a time the fear was felt that certain of the States might refuse to ratify unless the Constitution were amended. Accordingly the first Congress after the adoption of the Constitution proposed a series of amendments, which were promptly ratified by the States as Articles I–X of the amendments as they now stand. (See RIGHTS, BILL OF.) Articles XI and XII speedily followed, in 1793 and 1803, respectively. From that date to the Civil War, no amendments to the original instrument were adopted. The next three amendments, Articles XIII, XIV, and XV, were adopted in 1865, 1868, and 1870, respectively, as a part of the reconstruction policy of the government after the Civil War, in order to secure to the lately emancipated slaves the legal and political benefits of full citizenship in the United States and in the several States, and the last two, Articles XVI and XVII, in 1913, as the long result of the democratic movement of the new century. See RIGHTS, CIVIL; CIVIL WAR; RECONSTRUCTION; SLAVERY.

It remains to be said, in conclusion, that, in speaking of the constitution of a State, reference is made to the whole body of its fundamental law, whether embodied in written form or not. The constitution of every active political community is the product of many agencies and influences, not merely of deliberate legislative action. That of the United States is no exception to this rule. The Constitution, as adopted in the early formative period of the Republic, and formally amended from time to time in the manner therein prescribed, has been more extensively amended by the insensible processes of use and custom and by the far-reaching effects of judicial construction. As to the last, it may be said that the Constitution, in setting up a supreme judicial tribunal, with the function of passing upon the validity of national and State legislative action and of executive action, has indirectly provided for a process of amendment much more efficacious than that directly provided. The Constitution of the United States, as it exists to-day, therefore, must be looked for in the decisions of the courts and in the political practice of the people, as well as in the text of the original articles and their formal amendments. The leading authorities on the Constitution are: *The Federalist; Elliott's Debates in Convention on the Adoption of the Federal Constitution;* Curtis, *History, Origin, Formation, and Adoption of the Constitution of the United States;* Story, *Commentaries on the Constitution of the United States;* Cooley, *Treatise on the Constitutional Limitations which Rest upon the Legislative Powers of the States;* Von Holst, *Constitutional Law of the United States of America* (Chicago, 1887); De Tocqueville, *Democracy in America* (London, 1835); Bryce, *The American Commonwealth* (4th ed., 1913), and the *Cases on Constitutional Law of the United States,* collected and edited by J. B. Thayer (Cambridge, Mass., 1894–95). See also CONSTITUTION; CONSTITUTIONAL LAW; SUPREME COURT OF THE UNITED STATES. The text of the Constitution is as follows:

CONSTITUTION OF THE UNITED STATES

We, the people of the United States, in order to form a more perfect union, establish justice, insure domestic tranquillity, provide for the common defense, promote the general welfare, and secure the blessings of liberty to ourselves and our posterity, do ordain and establish this Constitution for the United States of America.

ARTICLE I, Sec. 1. All legislative powers herein granted shall be vested in a Congress of the United States, which shall consist of a Senate and House of Representatives.

Sec. 2. The House of Representatives shall be composed of members chosen every second year by the people of the several States, and the electors in each State shall have the qualifications requisite for electors of the most numerous branch of the State Legislature.

No person shall be a Representative who shall not have attained to the age of 25 years, and been seven years a citizen of the United States, and who shall not, when elected, be an inhabitant of that State in which he shall be chosen.

Representatives and direct taxes shall be apportioned among the several States which may be included within this Union according to their respective numbers, which shall be determined by adding to the whole number of free persons, including those bound to service for a term of years, and excluding Indians not taxed, three-fifths of all other persons. The actual enumeration shall be made within three years after the first meeting of the Congress of the United States, and within every subsequent term of ten years, in such manner as they shall by law direct. The number of Representatives shall not exceed one for every thirty thousand, but each State shall have at least one Representative; and until such enumeration shall be made, the State of New Hampshire shall be entitled to choose 3; Massachusetts, 8; Rhode Island and Providence Plantations, 1; Connecticut, 5; New York, 6; New Jersey, 4; Pennsylvania, 8; Delaware, 1; Maryland, 6; Virginia, 10; North Carolina, 5; South Carolina, 5; and Georgia, 3.

When vacancies happen in the representation from any State, the executive authority thereof shall issue writs of election to fill such vacancies.

The House of Representatives shall choose their Speaker and other officers; and shall have the sole power of impeachment.

Sec. 3. The Senate of the United States shall be composed of two Senators from each State, chosen by the legislature thereof, for six years; and each Senator shall have one vote.

Immediately after they shall be assembled in consequence of the first election, they shall be

divided as equally as may be into three classes. The seats of the Senators of the first class shall be vacated at the expiration of the second year, of the second class at the expiration of the fourth year, and of the third class at the expiration of the sixth year, so that one-third may be chosen every second year; and if vacancies happen by resignation, or otherwise, during the recess of the legislature of any State, the Executive thereof may make temporary appointments until the next meeting of the legislature, which shall then fill such vacancies.

No person shall be a Senator who shall not have attained to the age of thirty years, and been nine years a citizen of the United States, and who shall not, when elected, be an inhabitant of that State for which he shall be chosen.

The Vice President of the United States shall also be president of the Senate, but shall have no vote, unless they be equally divided.

The Senate shall choose their other officers, and also a president *pro tempore*, in the absence of the Vice President, or when he shall exercise the office of President of the United States.

The Senate shall have the sole power to try all impeachments; when sitting for that purpose, they shall be on oath or affirmation. When the President of the United States is tried, the Chief Justice shall preside; and no person shall be convicted without the concurrence of two-thirds of the members present.

Judgment in cases of impeachment shall not extend further than to removal from office, and disqualification to hold and enjoy any office of honor, trust, or profit under the United States; but the party convicted shall nevertheless be liable and subject to indictment, trial, judgment, and punishment, according to law.

Sec. 4. The times, places, and manner of holding elections for Senators and Representatives shall be prescribed in each State by the legislature thereof, but the Congress may at any time, by law, make or alter such regulations, except as to the places of choosing Senators.

The Congress shall assemble at least once in every year, and such meeting shall be on the first Monday in December, unless they shall, by law, appoint a different day.

Sec. 5. Each House shall be the judge of the elections, returns, and qualifications of its own members, and a majority of each shall constitute a quorum to do business; but a smaller number may adjourn from day to day, and may be authorized to compel the attendance of absent members, in such manner and under such penalties as each House may provide.

Each House may determine the rules of its proceedings, punish its members for disorderly behavior, and, with the concurrence of two-thirds, expel a member.

Each House shall keep a journal of its proceedings and from time to time publish the same, excepting such parts as may in their judgment require secrecy, and the yeas and nays of the members of either House on any question shall, at the desire of one-fifth of those present, be entered on the journal.

Neither House, during the sessions of Congress, shall, without the consent of the other, adjourn for more than three days, nor to any other place than that in which the two Houses shall be sitting.

Sec. 6. The Senators and Representatives shall receive a compensation for their services, to be ascertained by law, and paid out of the treasury of the United States. They shall in all cases, except treason, felony, and breach of the peace, be privileged from arrest during their attendance at the sessions of their respective Houses, and in going to and returning from the same; and for any speech or debate in either House they shall not be questioned in any other place.

No Senator or Representative shall, during the time for which he was elected, be appointed to any civil office under the authority of the United States, which shall have been created, or the emoluments whereof shall have been increased during such time; and no person holding any office under the United States shall be a member of either House during his continuance in office.

Sec. 7. All bills for raising revenue shall originate in the House of Representatives; but the Senate may propose or concur with amendments, as on other bills.

Every bill which shall have passed the House of Representatives and the Senate shall, before it become a law, be presented to the President of the United States; if he approve, he shall sign it; but if not, he shall return it, with his objections, to that House in which it shall have originated, who shall enter the objections at large on their journal, and proceed to reconsider it. If after such reconsideration two-thirds of that House shall agree to pass the bill, it shall be sent, together with the objections, to the other House, by which it shall likewise be reconsidered; and if approved by two-thirds of that House, it shall become a law. But in all such cases the votes of both Houses shall be determined by yeas and nays, and the names of the persons voting for and against the bill shall be entered on the journal of each House respectively. If any bill shall not be returned by the President within ten days (Sunday excepted) after it shall have been presented to him, the same shall be a law in like manner as if he had signed it, unless the Congress by their adjournment prevent its return; in which case it shall not be a law.

Every order, resolution, or vote to which the concurrence of the Senate and the House of Representatives may be necessary (except on a question of adjournment) shall be presented to the President of the United States; and before the same shall take effect, shall be approved by him, or, being disapproved by him, shall be repassed by two-thirds of the Senate and House of Representatives, according to the rules and limitations prescribed in the case of a bill.

Sec. 8. The Congress shall have power

To lay and collect taxes, duties, imposts, and excises, to pay the debts and provide for the common defense and general welfare of the United States; but all duties, imposts, and excises shall be uniform throughout the United States;

To borrow money on the credit of the United States;

To regulate commerce with foreign nations, and among the several States, and with the Indian tribes;

To establish an uniform rule of naturalization, and uniform laws on the subject of bankruptcies throughout the United States;

To coin money, regulate the value thereof, and of foreign coin, and fix the standard of weights and measures;

To provide for the punishment of counterfeiting the securities and current coin of the United States;

To establish post offices and post roads;

To promote the progress of science and useful arts, by securing for limited times, to authors and inventors, the exclusive right to their respective writings and discoveries;

To constitute tribunals inferior to the Supreme Court;

To define and punish piracies and felonies committed on the high seas, and offenses against the law of nations;

To declare war, grant letters of marque and reprisal, and make rules concerning captures on land and water;

To raise and support armies, but no appropriation of money to that use shall be for a longer term than two years;

To provide and maintain a navy;

To make rules for the government and regulation of the land and naval forces;

To provide for calling forth the militia to execute the laws of the Union, suppress insurrections, and repel invasions;

To provide for organizing, arming, and disciplining the militia, and for governing such part of them as may be employed in the service of the United States, reserving to the States respectively the appointment of the officers, and the authority of training the militia according to the discipline prescribed by Congress;

To exercise exclusive legislation in all cases whatsoever over such district (not exceeding ten miles square) as may, by cession of particular States, and the acceptance of Congress, become the seat of the Government of the United States, and to exercise like authority over all places purchased by the consent of the legislature of the State in which the same shall be, for the erection of forts, magazines, arsenals, dockyards, and other needful buildings; and

To make all laws which shall be necessary and proper for carrying into execution the foregoing powers, and all other powers vested by this Constitution in the Government of the United States, or in any department or officer thereof.

Sec. 9. The migration or importation of such persons as any of the States now existing shall think proper to admit shall not be prohibited by Congress prior to the year one thousand eight hundred and eight; but a tax or duty may be imposed on such importation, not exceeding ten dollars for each person.

The privilege of the writ of *habeas corpus* shall not be suspended, unless when in cases of rebellion or invasion the public safety may require it.

No bill of attainder or *ex post facto* law shall be passed.

No capitation or other direct tax shall be laid, unless in proportion to the census or enumeration hereinbefore directed to be taken.

No tax or duty shall be laid on articles exported from any State.

No preference shall be given by any regulation of commerce or revenue to the ports of one State over those of another; nor shall vessels bound to or from one State be obliged to enter, clear, or pay duties in another.

No money shall be drawn from the treasury but in consequence of appropriations made by law; and a regular statement and account of the receipts and expenditures of all public money shall be published from time to time.

No title of nobility shall be granted by the United States; and no person holding any office of profit or trust under them shall, without the consent of the Congress, accept of any present, emolument, office, or title, of any kind whatever, from any king, prince, or foreign State.

Sec. 10. No State shall enter into any treaty, alliance, or confederation; grant letters of marque and reprisal; coin money; emit bills of credit; make anything but gold and silver coin a tender in payment of debts; pass any bill of attainder, *ex post facto* law, or law impairing the obligation of contracts, or grant any title of nobility.

No State shall, without the consent of the Congress, lay any imposts or duties on imports or exports, except what may be absolutely necessary for executing its inspection laws; and the net produce of all duties and imposts, laid by any State on imports or exports, shall be for the use of the treasury of the United States; and all such laws shall be subject to the revision and control of the Congress.

No State shall, without the consent of Congress, lay any duty of tonnage, keep troops, or ships of war in time of peace, enter into any agreement or compact with another State, or with a foreign power, or engage in war, unless actually invaded, or in such imminent danger as will not admit of delay.

ARTICLE II, Sec. 1. The executive power shall be vested in a President of the United States of America. He shall hold his office during the term of four years, and, together with the Vice President, chosen for the same term, be elected as follows:

Each State shall appoint, in such manner as the legislature thereof may direct, a number of electors, equal to the whole number of Senators and Representatives to which the State may be entitled in the Congress; but no Senator or Representative, or persons holding an office of trust or profit under the United States, shall be appointed an elector.

The Congress may determine the time of choosing the electors, and the day on which they shall give their votes; which day shall be the same throughout the United States.

No person, except a natural-born citizen or a citizen of the United States at the time of the adoption of the Constitution, shall be eligible to the office of President; neither shall any person be eligible to that office who shall not have attained to the age of thirty-five years, and been fourteen years resident within the United States.

In case of the removal of the President from office, or of his death, resignation, or inability to discharge the powers and duties of the said office, the same shall devolve on the Vice President, and the Congress may by law provide for the case of removal, death, resignation, or inability, both of the President and Vice President, declaring what officer shall then act as President, and such officer shall act accordingly, until the disability be removed, or a President shall be elected.

The President shall, at stated times, receive for his services a compensation, which shall neither be increased nor diminished during the period for which he shall have been elected, and he shall not receive within that period any other emolument from the United States, or any of them.

Before he enters on the execution of his office, he shall take the following oath or affirmation: "I do solemnly swear (or affirm) that I will faithfully execute the office of President of the United States, and will, to the best of my

ability, preserve, protect, and defend the Constitution of the United States."

Sec. 2. The President shall be commander in chief of the army and navy of the United States, and of the militia of the several States when called into the actual service of the United States; he may require the opinion, in writing, of the principal officer in each of the executive departments upon any subject relating to the duties of their respective offices, and he shall have power to grant reprieves and pardons for offenses against the United States, except in cases of impeachment.

He shall have power, by and with the advice and consent of the Senate, to make treaties, provided two-thirds of the Senators present concur; and he shall nominate, and by and with the advice and consent of the Senate, shall appoint ambassadors, other public ministers and consuls, judges of the Supreme Court, and all other officers of the United States, whose appointments are not herein otherwise provided for, and which shall be established by law; but the Congress may by law vest the appointment of such inferior officers as they think proper in the President alone, in the courts of law, or in the heads of departments.

The President shall have power to fill up all vacancies that may happen during the recess of the Senate, by granting commissions which shall expire at the end of their next session.

Sec. 3. He shall from time to time give to the Congress information of the state of the Union, and recommend to their consideration such measures as he shall judge necessary and expedient; he may on extraordinary occasions convene both Houses, or either of them, and in cases of disagreement between them, with respect to the time of adjournment, he may adjourn them to such time as he shall think proper; he shall receive ambassadors and other public ministers; he shall take care that the laws be faithfully executed, and shall commission all the officers of the United States.

Sec. 4. The President, Vice President, and all civil officers of the United States, shall be removed from office on impeachment for, and conviction of, treason, bribery, or other high crimes and misdemeanors.

ARTICLE III, Sec. 1. The judicial power of the United States shall be vested in one Supreme Court, and in such inferior courts as the Congress may from time to time ordain and establish. The judges, both of the Supreme and inferior courts, shall hold their offices during good behavior, and shall, at stated times, receive for their services a compensation, which shall not be diminished during their continuance in office.

Sec. 2. The judicial power shall extend to all cases, in law and equity, arising under this Constitution, the laws of the United States, and treaties made, or which shall be made, under their authority; to all cases affecting ambassadors, other public ministers, and consuls; to all cases of admiralty and maritime jurisdiction; to controversies to which the United States shall be a party; to controversies between two or more States; between a State and citizens of another State; between citizens of different States; between citizens of the same State claiming lands under grants of different States, and between a State, or the citizens thereof, and foreign States, citizens, or subjects.

In all cases affecting ambassadors, other public ministers, and consuls, and those in which a State shall be party, the Supreme Court shall have original jurisdiction. In all the other cases before mentioned, the Supreme Court shall have appellate jurisdiction, both as to law and fact, with such exceptions and under such regulations as the Congress shall make.

The trial of all crimes, except in cases of impeachment, shall be by jury; and such trial shall be held in the State where the said crimes shall have been committed; but when not committed within any State, the trial shall be at such place or places as the Congress may by law have directed.

Sec. 3. Treason against the United States shall consist only in levying war against them, or in adhering to their enemies, giving them aid and comfort.

No person shall be convicted of treason unless on the testimony of two witnesses to the same overt act, or on confession in open court.

The Congress shall have power to declare the punishment of treason; but no attainder of treason shall work corruption of blood, or forfeiture except during the life of the person attainted.

ARTICLE IV, Sec. 1. Full faith and credit shall be given in each State to the public acts, records, and judicial proceedings of every other State. And the Congress may by general laws prescribe the manner in which such acts, records, and proceedings shall be proved, and the effect thereof.

Sec. 2. The citizens of each State shall be entitled to all privileges and immunities of citizens in the several States.

A person charged in any State with treason, felony, or other crime, who shall flee from justice, and be found in another State, shall, on demand of the executive authority of the State from which he fled, be delivered up, to be removed to the State having jurisdiction of the crime.

No person held to service or labor in one State, under the laws thereof, escaping into another, shall, in consequence of any law or regulation therein, be discharged from such service or labor, but shall be delivered up on claim of the party to whom such service or labor may be due.

Sec. 3. New States may be admitted by the Congress into this Union; but no new State shall be formed or erected within the jurisdiction of any other State, nor any State be formed by the junction of two or more States, or parts of States, without the consent of the legislatures of the States concerned as well as of the Congress.

The Congress shall have power to dispose of and make all needful rules and regulations respecting the territory or other property belonging to the United States; and nothing in this Constitution shall be so construed as to prejudice any claims of the United States, or any particular State.

Sec. 4. The United States shall guarantee to every State in this Union a republican form of government, and shall protect each of them against invasion, and, on application of the legislature, or of the Executive (when the legislature cannot be convened), against domestic violence.

ARTICLE V. The Congress, whenever two-thirds of both Houses shall deem it necessary, shall propose amendments to this Constitution, or, on the application of the legislatures of

two-thirds of the several States, shall call a convention for proposing amendments, which, in either case, shall be valid to all intents and purposes as part of this Constitution, when ratified by the legislatures of three-fourths of the several States, or by conventions in three-fourths thereof, as the one or the other mode of ratification may be proposed by the Congress; provided, that no amendment which may be made prior to the year one thousand eight hundred and eight shall in any manner affect the first and fourth clauses in the ninth section of the first article; and that no State, without its consent, shall be deprived of its equal suffrage in the Senate.

ARTICLE VI. All debts contracted and engagements entered into before the adoption of this Constitution shall be as valid against the United States under this Constitution, as under the Confederation.

This Constitution and the laws of the United States which shall be made in pursuance thereof, and all treaties made, or which shall be made, under the authority of the United States, shall be the supreme law of the land; and the judges in every State shall be bound thereby, anything in the Constitution or laws of any State to the contrary notwithstanding.

The Senators and Representatives before mentioned, and the members of the several State legislatures, and all executive and judicial officers, both of the United States and of the several States, shall be bound by oath or affirmation to support this Constitution; but no religious test shall ever be required as a qualification to any office or public trust under the United States.

ARTICLE VII. The ratification of the conventions of nine States shall be sufficient for the establishment of this Constitution between the States so ratifying the same.

Done in convention, by the unanimous consent of the States present, the 17th day of September, in the year of our Lord one thousand seven hundred and eighty-seven, and of the independence of the United States of America the twelfth.

AMENDMENTS

ARTICLE I. Congress shall make no law respecting an establishment of religion, or prohibiting the free exercise thereof; or abridging the freedom of speech or of the press; or the right of the people peaceably to assemble, and to petition the Government for redress of grievances.

ARTICLE II. A well-regulated militia being necessary to the security of a free State, the right of the people to keep and bear arms shall not be infringed.

ARTICLE III. No soldier shall, in time of peace, be quartered in any house without the consent of the owner, nor in time of war but in a manner to be prescribed by law.

ARTICLE IV. The right of the people to be secure in their persons, houses, papers, and effects, against unreasonable searches and seizures, shall not be violated; and no warrants shall issue but upon probable cause, supported by oath or affirmation, and particularly describing the place to be searched, and the persons or things to be seized.

ARTICLE V. No person shall be held to answer for a capital or otherwise infamous crime, unless on a presentment or indictment of a grand jury, except in cases arising in the land or naval forces, or in the militia, when in actual service, in time of war and public danger; nor shall any person be subject for the same offense to be twice put in jeopardy of life or limb, nor shall be compelled in any criminal case to be a witness against himself, nor be deprived of life, liberty, or property, without due process of law; nor shall private property be taken for public use without just compensation.

ARTICLE VI. In all criminal prosecutions, the accused shall enjoy the right to a speedy and public trial, by an impartial jury of the State and district wherein the crime shall have been committed, which district shall have been previously ascertained by law, and to be informed of the nature and cause of the accusations; to be confronted with the witnesses against him; to have compulsory process for obtaining witnesses in his favor, and to have the assistance of counsel for his defense.

ARTICLE VII. In suits at common law, where the value in controversy shall exceed twenty dollars, the right of trial by jury shall be preserved, and no fact tried by a jury shall be otherwise reëxamined in any court of the United States than according to the rules of the common law.

ARTICLE VIII. Excessive bail shall not be required, nor excessive fines imposed, nor cruel and unusual punishment inflicted.

ARTICLE IX. The enumeration in the Constitution of certain rights shall not be construed to deny or disparage others retained by the people.

ARTICLE X. The powers not delegated to the United States by the Constitution, nor prohibited by it to the States, are reserved to the States respectively, or to the people.

ARTICLE XI. The judicial power of the United States shall not be construed to extend to any suit in law or equity commenced or prosecuted against one of the United States by citizens of another State, or by citizens or subjects of any foreign State.

ARTICLE XII. The electors shall meet in their respective States, and vote by ballot for President and Vice President, one of whom at least shall not be an inhabitant of the same State with themselves. They shall name in their ballots the person voted for as President, and in distinct ballots the person voted for as Vice President; and they shall make distinct lists of all persons voted for as President, and of all persons voted for as Vice President, and of the number of votes for each, which lists they shall sign and certify, and transmit, sealed, to the seat of the Government of the United States, directed to the President of the Senate. The President of the Senate shall, in the presence of the Senate and House of Representatives, open all the certificates, and the votes shall then be counted; the person having the greatest number of votes for President shall be the President, if such number be a majority of the whole number of electors appointed; and if no person have such a majority, then from the persons having the highest numbers, not exceeding three, on the list of those voted for as President, the House of Representatives shall choose immediately, by ballot, the President. But in choosing the President, the votes shall be taken by States, the representation from each State having one vote; a quorum for this purpose shall consist of a member or

members from two-thirds of the States, and a majority of all the States shall be necessary to a choice. And if the House of Representatives shall not choose a President, whenever the right of choice shall devolve upon them, before the fourth day of March next following, then the Vice President shall act as President, as in the case of the death or other constitutional disability of the President. The person having the greatest number of votes as Vice President shall be the Vice President, if such number be a majority of the whole number of electors appointed; and if no person have a majority, then from the two highest numbers on the list the Senate shall choose the Vice President; a quorum for the purpose shall consist of two-thirds of the whole number of Senators, and a majority of the whole number shall be necessary to a choice. But no person constitutionally ineligible to the office of President shall be eligible to that of Vice President of the United States.

ARTICLE XIII, Sec. 1. Neither slavery nor involuntary servitude, except as a punishment for crime whereof the party shall have been duly convicted, shall exist within the United States, or any place subject to their jurisdiction.

Sec. 2. Congress shall have power to enforce this article by appropriate legislation.

ARTICLE XIV, Sec. 1. All persons born or naturalized in the United States, and subject to the jurisdiction thereof, are citizens of the United States, and of the State wherein they reside. No State shall make or enforce any law which shall abridge the privileges or immunities of citizens of the United States; nor shall any State deprive any person of life, liberty, or property without due process of law, nor deny to any person within its jurisdiction the equal protection of the laws.

Sec. 2. Representatives shall be apportioned among the several States according to their respective numbers, counting the whole number of persons in each State, excluding Indians not taxed. But when the right to vote at any election for the choice of electors for President and Vice President of the United States, Representatives in Congress, the executive and judicial officers of a State, or the members of the legislature thereof, is denied to any of the male inhabitants of such State being twenty-one years of age, and citizens of the United States, or in any way abridged, except for participation in rebellion or other crime, the basis of representation therein shall be reduced in the proportions which the number of such male citizens shall bear to the whole number of male citizens twenty-one years of age in such State.

Sec. 3. No person shall be a Senator or Representative in Congress, or Elector of President and Vice President, or hold any office, civil or military, under the United States, or under any State, who, having previously taken an oath as a member of Congress, or as an officer of the United States, or as a member of any State legislature, or as an executive or judicial officer of any State, to support the Constitution of the United States, shall have engaged in insurrection or rebellion against the same, or given aid or comfort to the enemies thereof. But Congress may, by a vote of two-thirds of each House, remove such disability.

Sec. 4. The validity of the public debt of the United States authorized by law, including debts incurred for payment of pensions and bounties for services in suppressing insurrection or rebellion, shall not be questioned. But neither the United States nor any State shall assume or pay any debt or obligation incurred in aid of insurrection or rebellion against the United States, or any claim for the loss or emancipation of any slave; but all such debts, obligations, and claims shall be held illegal and void.

Sec. 5. The Congress shall have power to enforce, by appropriate legislation, the provisions of this article.

ARTICLE XV, Sec. 1. The right of the citizens of the United States to vote shall not be denied or abridged by the United States, or by any State, on account of race, color, or previous condition of servitude.

Sec. 2. The Congress shall have power to enforce this article by appropriate legislation.

ARTICLE XVI. The Congress shall have power to lay and collect taxes on incomes, from whatever source derived, without apportionment among the several States, and without regard to any census or enumeration.

ARTICLE XVII, Sec. 1. The Senate of the United States shall be composed of two Senators from each State, elected by the people thereof, for six years; and each Senator shall have one vote. The electors in each State shall have the qualifications requisite for electors of the most numerous branch of the State legislatures.

Sec. 2. When vacancies happen in the representation of any State in the Senate, the executive authority of such State shall issue writs of election to fill such vacancies: Provided, That the legislature of any State may empower the executive thereof to make temporary appointment until the people fill the vacancies by election as the legislature may direct.

Sec. 3. This amendment shall not be so construed as to affect the election or term of any Senator chosen before it becomes valid as part of the Constitution.

CONSTITUTIONS, APOSTOLICAL. See APOSTOLIC CONSTITUTIONS AND CANONS.

CONSTITUTIONS OF CLARENDON. See CLARENDON, CONSTITUTIONS OF.

CONSTRUCTION (Lat. *constructio*, from *construere*, to construct, from *com-*, together + *struere*, to heap). In geometry, the process of drawing a figure so as to satisfy the conditions of a given problem. Thus, to construct an equilateral triangle of side a: with the ends of a as centres and with a radius equal to a describe circles; connect either intersection with the ends of a. Here the construction seems at first not to be unique, since two triangles satisfy the condition, but it is evident that there is essentially only one construction, for the triangles are congruent. In solving problems, a valuable method is to assume the construction and investigate the properties of the figure. Thus, to draw a line through a given point parallel to a given line: assuming the construction and a transversal of the parallels through the given point, it appears that the alternate angles are equal; hence, to construct the figure, draw a transversal through the point cutting the given line and construct the alternate angle equal to the angle formed by the transversal and the given line.

Another fruitful method is that of the inter-

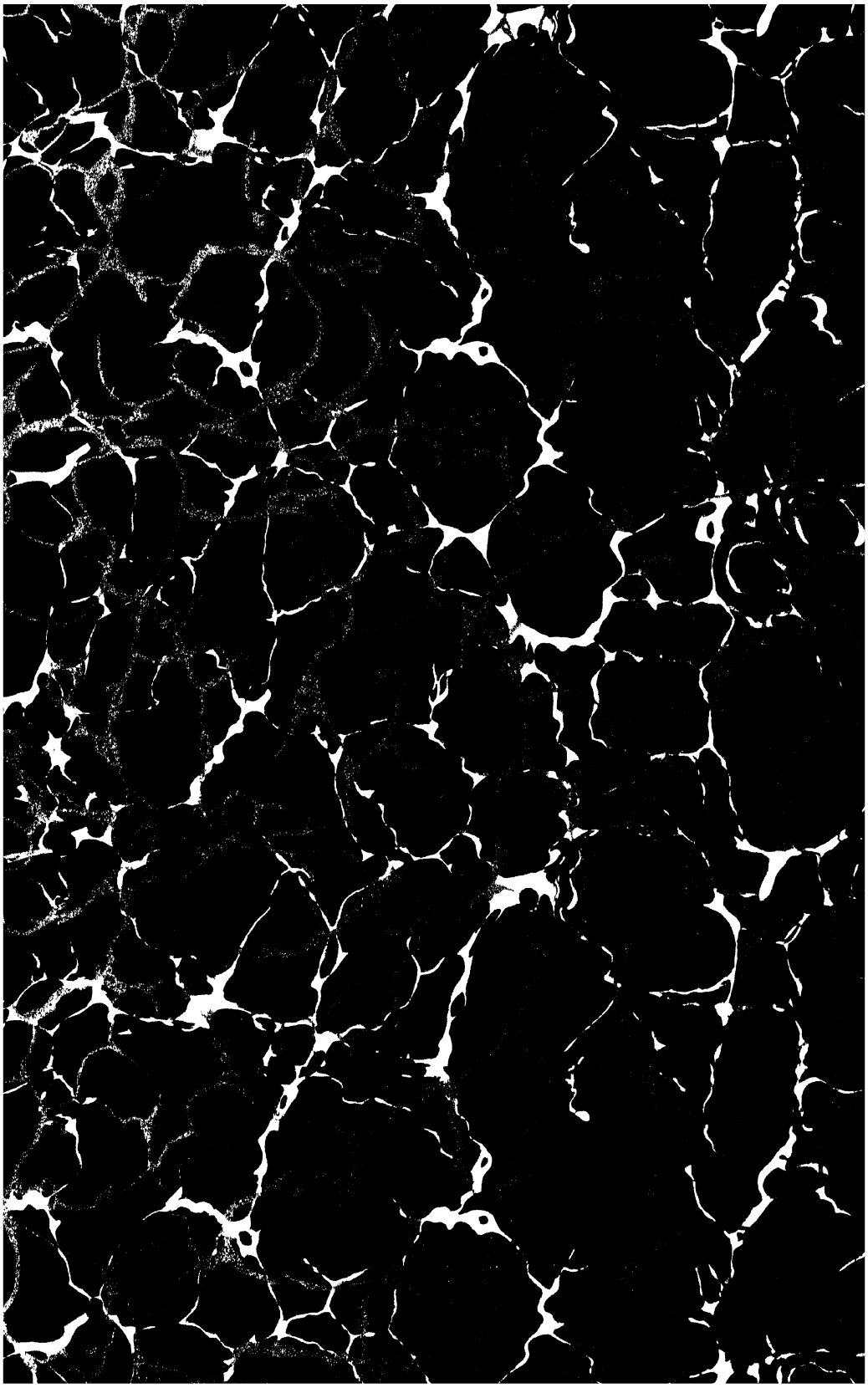
section of loci; e.g., if it is known that a point is on each of two intersecting straight lines, it is uniquely determined as their point of intersection; but if it is on a straight line and a circle which the line intersects, it may be either of the two points of intersection.

The best works upon the constructions of elementary geometry are Petersen, *Methods and Theories* (Copenhagen and London, 1879); Rouché and De Comberousse, *Traité de géométrie* (Paris, 1900); Alexandroff, *Problèmes de géométrie élémentaire*, trans. into French by Aitoff (Paris, 1899); Knobloch, *Sammlung geometrischen Konstruktionen* (Altona, 1911); and Adler, *Theorie der geometrischen Konstruktionen* (Leipzig, 1906).

CONSTRUCTIONISTS, STRICT. See STRICT CONSTRUCTIONISTS.

CON'SUA'LIA. See CIRCUS.

CONSUELO, kôn-swā'lō. A famous novel by George Sand (1842) and the name of its chief character.





3855